IN THE SPECIFICATION:

Please amend the Specification as shown;

BACKGROUND OF THE INVENTION

This invention is continuation of application serial number 10/614,654 ~~not yet assigned~~ filed on 7-7-03 (having claims 182 - 185) which is a division of application serial number 09/463,171 filed on 1-18-00, patent number 6,591,074, which has priority from PCT Publication WO 99/04320 (PCT/US98/14862), which has priority from serial number 08/979,735 filed on 11-26-97, now patent number 6,356,724, which is a continuation-in-part of serial number 08/896,491 filed 7-18-97, now patent number 5,878,306.

This invention relates to solving problems in imaging machines as well as toner cartridges used in Xerography and more specifically in the toner cartridge remanufacturing industry. This includes copiers, laser printers, facsimile machines, or any other imaging machine. However, this invention may also relate to these copiers, laser printers, facsimile, or other imaging machines as well as the toner cartridges used in these imaging machines. The users of this invention will typically be toner cartridge remanufacturers as well as service technicians.

CANON has designed an all-in-one cartridge as in Patent Number 4,975,744, issued 12-4-90 and assigned to CANON. Several companies have used these cartridges in laser printers, copy machines and facsimile machines, each with the varying printer engines and a different nameplate. Originally, these cartridges were designed to be "disposable". However, after the first all-in-one toner cartridge was introduced, it did not take long before laser cartridge remanufacturers such as myself began remanufacturing cartridges. These "disposable" cartridges were designed to function for only one cartridge cycle without remanufacturing. The remanufacturers had found certain components that needed replacement on a regular basis. In 1990, the first aftermarket photoreceptor drum became available for use in remanufacturing the all-in-one cartridge of the "SX" engine variety, the

most popular printer cartridge from around 1987 through 1996. When the long-life photoreceptor drum became available, the entire remanufacturing industry turned around and gained credibility and began a huge growth surge that still continues. In October 1993, HEWLETT-PACKARD, the largest seller of this printer engine using the all-in-one cartridge, entered the cartridge remanufacturing industry with the "Optiva" cartridge, further increasing the size as well as credibility of this relatively new industry. However, this relatively new industry grew from the all-in-one cartridge shortly after its debut. Before the introduction of the long-life drum, sometimes called the "superdrum" or "duradrum", the SX cartridge would last for around three cartridge remanufacturing cycles at best, since the maximum useful life of the OEM drum was three cycles. However, the long-life drums got their names from the fact that they were designed to last for many remanufacturing cycles or recharges as they are sometimes called. Typically, the long life drum can last for ten or more such cycles, unlike the typical OEM (Original Equipment Manufacturer) drum. With the additional developments of drum coatings, originally designed for OEM drums, the long-life drum may last for many additional cycles. Some coatings, in theory, were designed to be dissolved and removed from over the drum surface every 1-3 cycles, so the drum life of the long-life drum almost seems limitless.

However, with photoreceptor drums lasting for many cycles and replacement drums available, other components of the cartridge have a tendency to require greater durability, and longevity. Also, as the success of these cartridges has skyrocketed, the demand is for cartridges with longer cycles, so component improvements are significant. Therefore, avoiding natural problems with prevention means must also be implemented for cartridges of longer life both in longer cycle times and greater number of cycles.

This is true of all the various flexible components that need to be replaced or added to these devices (toner cartridges, laser printers, copiers and facsimile machines), particularly

plastic flexible components as well as flexible elastomeric components. Inventor will receive patent number Re 35,529 that will be issued on 6-10-97 that uses a setting or positioning device of this kind to install a shipping seal assembly, so, a concept has been developed by inventor that may be used in other applications. However, inventor has realized that the concept may also be used on elastomeric blades, plastic blades and thin metal blades that go into the machines and toner cartridges. Some of these blades include but are not limited to the recovery blades otherwise known in the art as catcher blades, sweeper blades, keeper blades, keepers, MYLAR blades, recovery blades on the waste hopper, recovery blades in the toner hopper, strips, doctor blades, metering blades, spreader blades, strips, doctor blades, plastic strips, urethane rubber strips, wiper blades, scraper blades, toner scrapers, drum cleaning blades, cleaning blades, urethane blades, and blades. In the remanufacturing industry and in the service technician industry, various strips get kinked, wavy, bowed, warped just from performing the service or remanufacturing. Sometimes the blades need replacement just from age-wear problems. For example, in the typical case for most any toner cartridge, just from vacuuming a waste toner hopper, the recovery blades and cleaning blades may get kinks caused by suction of the vacuum cleaner. As remanufacturers desire speed in the remanufacturing process, vacuuming the hoppers can cause these problems with the desire for greater suction to achieve greater speed. Cost is money. Even without the high suction, these problems can occur. Inventor has patents number 5,237,375, 5,500,128 and 5,479,250 that deal with placing a permanent stiffener on the blades to reinforce them, both wiper blades (drum cleaning blades), spreader blades, and recovery blades as well as conductive coatings that aid in many ways. These conductive coatings may also be used in conjunction with this invention as well as making any of the mentioned blades of conductive plastic and/or rubber.

In the IBM-4019/4029/4039 series of cartridges, there are various plastic blades in the

toner hopper that easily kink or otherwise get deformed and need replacement in the remanufacturing process. Consequently, these blades also need replacement. Not replacing these blades fairly regularly means cartridge failure because just the remanufacturing process itself can cause the blades to fail, kink, wave, flip, bend backwards, flare, warp, curl, loosen, stretch, or otherwise deform. There are blades on the toner hopper section that need replacement as well as on the waste toner hopper section.

In most imaging machines and toner cartridges there is a urethane rubber spreader blade that spreads the toner on the developer roller and charges the toner in the process. These blades often need replacement. Inventor also has patent number 5,546,162 that deals with method, device and kit for addition or replacement of spreader blades that can be improved further with this invention or even replaced with this invention. This invention may be also applied as well to wiper blades otherwise known as drum cleaning blades, to replace the urethane blade on a metal frame or even to the toner cartridge frame in some designs of the future.

Most recovery blades use the pressure-sensitive type self-adhesive type with a release liner and are very thin, made of MYLAR or other thin plastic approximately five thousandths of an inch thick and therefore (generally ranging but not limited to around two to 50 thousandths of an inch thick), are very flimsy and difficult and tedious to install. Some people sell a install tool that must be installed separately for each recovery blade. This device consists basically of a plastic V-strip spring-clamp similar to a cheap plastic temporary removable bookbinder which has a spring pressure and squeezes the strip tight to grip it. To use this tool, the installer squeezes the plastic strip install tool to spread the clamp like opening to open it up. Then he places the recovery blade strip inside the spring-clamp install tool. Then he lets go from squeezing the tool whereby the tool exerts a squeezing pressure on the recovery blade and thereby grips the recovery blade. Then, the bookbinder tool is used

as a firm handle to place or position the recovery blade in place and after the recovery blade is installed, the tool is again squeezed to remove it easily from the recovery blade. One disadvantage of this system is that the installer must individually go through the full lengthy procedure of installing and uninstalling the spring-clamp install tool for each individual recovery blade to be installed.

This invention may also be used for installing replacement blades in hoppers and waste hoppers, retaining blades, and also, of course, for paddlestrip blades. Paddlestrip blades are blades usually of plastic or urethane that are attached to a rotating metal frame known as the "paddle" that helps wipe the waste toner off the photoreceptor and then scoop this toner into the waste toner hopper. It can also be called the sweeper blade, scooper blade, the sweeper, the scooper, or the trash collector blade among other names.

With this invention, a flat removably adhered install device comes pre-installed on each individual strip and after each strip is installed, the device is merely peeled or otherwise removed very simply. Device removal after strip installation is simpler than peeling a banana peel because only one strip is peeled, whereas a banana peel requires several strips to be removed. Similarly, this device is easier to remove than having to remove the spring-clamp install tool because firstly, the device is pre-installed on every strip in the manufacturing process and secondly, the strip peels off easily like a banana peel. Also, the throwaway install device can in some manufacturing processes improve the manufacturability of the blade-product, depending on how sophisticated one gets.

Shipping seals are used to seal a toner cartridge prior to use. The installation process of a seal-assembly is cumbersome and there is a release liner that must be removed by the seal-assembly installer. This release liner is sometimes removed using prior art by feeling the edge of the seal-assembly with one's fingernail until the release liner is slightly separated after

which the seal installer then removes the release liner which is there for the purpose of protecting the adhesive properties of the seal-assembly until the time when the seal installer installs the seal. Another prior art way the seal installer typically removes the protective release liner during the assembly process is by using a blade, knife, razor blade, box cutter or other sharp edge to make a separation between the release liner and the adhesive/glue/tape/adherent that will be used to attach the seal-assembly to the toner hopper. Once the separation is started, then the seal installer can remove the protective release liner. Either prior art process of removing the release liner takes about twenty seconds. This twenty seconds can be saved with the device and methods of this invention.

Prior art strips and blades may also have the problem involving the time required to remove the adhesive liner from the strips and blades.

Read the rest of the patent to find out how this works.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to make a shipping seal with a handle on a body portion of the shipping seal so that the shipping seal installer may pull on the handle and by pulling the handle will more quickly remove a release liner that must be removed in order to expose a glue/adhesive/adherent/tape surface so that the seal will adhere to a toner hopper with fresh adhesive. This handle for quick removal of release liner should save about twenty seconds each time a seal is installed over prior art.

It is a further object of this invention to make a shipping seal device with a kiss-cut in a seal-insert assembly so that a region may utilize the principle of adhesive masking so that the shipping seal will not get stuck when pulling a tear-strip or pull-means. Also this prevents a seal from de-laminating from the toner hopper attach area fully or partially.

It is a further object of this invention to make a shipping seal device that has a middle layer that is rigid or semi-rigid.

It is a further object of this invention to make a shipping seal device that uses a tear-guide to assure that the tear-width is not less than the width of the tear-guide.

It is a further object of this invention to make a shipping seal device that uses a material that tears to open up an opening to allow toner to flow.

It is a further object of this invention to make a shipping seal device that optionally uses pre-cuts to initialize the tear width.

It is a further object of this invention to make a shipping seal-assembly whereby each seal-assembly has a positioning support.

It is a further object of this invention to provide a method of making a shipping seal device.

It is a further object of this invention to make a shipping seal-assembly page so that a page may hold a group of seal assemblies that can be removed from the page for better storage and inventory.

It is a further object of this invention to make a shipping seal-assembly page so that the page is made of a release liner material and when the seal-assembly is removed from the page, the adhesive is exposed to save time required to otherwise remove a release liner used to protect the adhesive/adherent/tape/glue.

It is a further object of this invention to make a shipping seal-assembly page where the page has a low-tack adhesive and the low-tack adhesive holds the seal-assembly on the page until the seal-assembly is removed from the page.

It is a further object of this invention to make a shipping seal-assembly page whereby each seal-assembly has a positioning support.

It is a further object of this invention to provide a method of making a shipping seal-assembly page.

It is a further object of this invention to make a multiple strip-assembly using a low-tack paper.

It is a further object of this invention to make a multiple strip-assembly where each said strip has a handle used for easy and quick removal of protective release liner.

It is a further object of this invention to provide a method of making a multiple strip-assembly.

~~Accordingly, it~~ It is a[[n]] further object of this invention to make an install tool stiffener positioning device manufactured as a component of a recovery blade for easy install that is removably adhered to the recovery blade and after the recovery blade is installed, the install tool stiffener is peeled off of the recovery blade.

It is a further object of this invention to make an install tool stiffener positioning device manufactured as a component of a drum cleaning blade for easy install that is removably adhered to the drum cleaning blade and after the drum cleaning blade is installed, the install tool stiffener is peeled off of the drum cleaning blade.

It is a further object of this invention to make an install tool stiffener positioning device manufactured as a component of a spreader blade for easy install that is removably adhered to the spreader blade and after the spreader blade is installed, the install tool stiffener is peeled off of the spreader blade.

It is a further object of this invention to make an install tool stiffener positioning device manufactured as a component of a doctor blade for easy install that is removably adhered to the doctor blade and after the doctor blade is installed, the install tool stiffener is peeled off of the doctor blade.

It is a further object of this invention to make an install tool stiffener positioning

device manufactured as a component of any blade for easy install that is removably adhered to a blade of any type, plastic or elastomeric, and after the blade is installed, the install tool stiffener is peeled off of the blade.

In carrying out this invention in the illustrative embodiment thereof, ~~the flat removably adhered install tool comes installed on the strips and after the strips are installed, the tool is merely peeled or otherwise removed very simply. Tool removal after strip installation is simpler than peeling a banana peel because only one strip is peeled, whereas a banana peel requires several strips to be removed. Also, the install tool can in many manufacturing processes improve the manufacturability of the product, depending on how fancy one goes because it is easier to adhesively coat or laminate and die-cut stiff material than it is to do with flexible material.~~ a seal-assembly is made with a handle that attaches to a release liner. The seal-assembly installer pulls the handle and the release liner is easily removed without having to spend time finding the right place to delaminate the protective release liner. The same may be done with a multiple strip assembly. A multiple seal-assembly is another solution where a seal-assembly is removed from a page of seal-assemblies. With a multiple seal-assembly, the middle portion of the seal-insert which requires labor to remove in manufacturing can optionally designed to stay on the page when the seal-assembly is removed. Thus, this throw-away middle portion can be discarded when removing the seal from the page which saves on labor costs required to manufacture the seal-assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention, together with other objects, features, aspects, and advantages thereof, will be more clearly understood from the following description, considered in conjunction with the accompanying drawings.

Figure 1 is an isometric cutaway view of a prior art waste toner hopper assembly.

Figure 2 is a side view of a prior art waste hopper and photoreceptor in theory.

Figure 3A shows a side view of a prior art spring clip from the bookbinding industry.

Figure 3B shows an isometric view of a prior art bookbinding clip.

Figure 3C shows a shipping seal as used in a toner hopper.

Figure 3D shows a shipping seal with a stiffener as used in a toner hopper.

Figure 3E shows an installed shipping seal in a toner hopper.

Figure 4 shows the mechanics of an imaging machine.

Figure 5 shows a prior art side view cutaway of a toner hopper.

Figure 6A shows an isometric view of a prior art recovery blade.

Figure 6B shows a side view of a prior art recovery blade.

Figure 6C shows an improved recovery blade in isometric view.

Figure 7A shows an improved recovery blade assembly in isometric view.

Figure 7B shows a side view of an improved recovery blade assembly.

Figure 7C shows a further improved recovery blade assembly.

Figure 7D shows an even further improved recovery blade assembly.

Figure 8 shows an isometric cutaway view of the technician removing the adhesive protective liner from the improved recovery blade assembly.

Figure 9 shows an isometric view of the technician preparing to install a recovery blade assembly.

Figure 10 shows an isometric cutaway view of the technician furthering the procedure of installing the recovery blade assembly onto a waste toner hopper.

Figure 11A shows an isometric cutaway view of the removal of the stiffener positioning tool from a waste toner hopper.

Figure 11B shows a cutaway view of a waste toner hopper with an improved recovery blade assembly partially installed.

Figure 11C shows an isometric view of an ergonomic recovery blade with a userfriendly handle.

Figure 11D shows an isometric view of an ergonomic recovery blade with a userfriendly handle for removing the support and another handle for removing the release liner.

Figure 12 shows an isometric cutaway view of a further step in the installation of the recovery blade assembly, the removal of the disposable stiffener device.

Figure 13 shows a pickup magnet sheet assembly in isometric view.

Figure 13A shows a side view cutaway of a section of the pickup magnet sheet assembly.

Figure 14 is a cutaway isometric view of a waste toner hopper showing the relationship between the pickup magnet and the recovery blade.

Figure 15A shows a new and improved recovery blade assembly.

Figure 15B shows a new and improved recovery blade assembly.

Figure 16 shows a prior art frame of a doctor blade assembly from an SX toner

cartridge.

Figure 17 shows an isometric view of a converted SX doctor blade into a spreader blade.

Figure 18 shows a prior art LX spreader blade.

Figure 19 shows a prior art NX spreader blade.

Figure 20 shows a prior art converted doctor blade into a spreader blade.

Figure 21A shows a new and improved assembly jig in isometric view used for installation of a doctor blade into a spreader blade conversion.

Figure 21B shows an SX doctor blade as it is placed into the assembly jig for a conversion process into a spreader blade.

Figure 22 shows the new and improved spreader blade in cutaway view.

Figure 23 shows the beginning process of installation of the spreader blade onto a doctor blade to make a spreader blade assembly.

Figure 24 shows a cutaway isometric view of a spreader blade conversion process further along.

Figure 25 shows an isometric view of the conversion process further yet along.

Figure 26 shows a cutaway isometric view of a further step in the doctor blade to spreader blade conversion process.

Figure 27 shows the doctor blade converted into a spreader blade.

Figure 28A shows another device and process for converting a doctor blade into a spreader blade.

Figure 28B shows another view of a new and improved device for placing a spreader blade on a frame.

Figure 28C shows another new and improved device for placing a spreader blade on a frame.

Figure 28D shows another view of a new and improved device for placing a spreader blade on a frame.

Figure 29A shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 29B shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 29C shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 30 shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 31 shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 32 shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 33A shows an isometric view of an improved wiper blade assembly device and method.

Figure 33B shows an isometric breakdown view of an improved wiper blade assembly device and method.

Figure 34 shows a shipping seal assembly.

Figure 35 shows the process of assembling a shipping seal on a toner hopper in isometric view.

Figure 36 shows a component of a shipping seal, the tear subassembly.

Figure 37 shows a component of a shipping seal, another tear subassembly.

Figure 38A shows a seal-insert subassembly of a shipping seal in isometric view.

Figure 38AA shows a seal-insert subassembly of a shipping seal in isometric view

which has a handle incorporated for easy removal of the release liner.

Figure 38B shows an improved seal-insert subassembly of a shipping seal in isometric view.

Figure 38BB shows an improved seal-insert subassembly of a shipping seal in isometric view which has a handle incorporated for easy removal of the release liner.

Figure 38C shows an improved seal-insert subassembly of a shipping seal in isometric view.

Figure 38CC shows an improved seal-insert subassembly of a shipping seal in isometric view which has a handle incorporated for easy removal of the release liner.

Figure 38CCC shows an improved seal-insert subassembly of a shipping seal in isometric view which has a handle incorporated for easy removal of the release liner.

Figure 38D shows an improved seal-insert subassembly of a shipping seal in isometric view.

Figure 38D shows an improved seal-insert subassembly of a shipping seal in isometric view which has a handle incorporated for easy removal of the release liner.

Figure 39 shows a shipping seal assembly.

Figure 40 shows a new and improved shipping seal assembly.

Figure 41 shows a toner hopper with an installed sidewall seal.

Figure 42 shows an isometric view of an improved sidewall seal assembly over a cutout portion of a toner hopper where the seal is to be installed.

Figure 43 shows a new and improved sidewall seal with the liner being peeled.

Figure 44 shows part of the installation process of a prior art sidewall seal into a cutaway isometric of a toner hopper.

Figure 45 shows part of the installation process of a sidewall seal into an isometric cutaway toner hopper.

Figure 46 shows an isometric of a further improved sidewall seal.

Figure 47 shows a side view cutaway of a toner hopper with an installed sidewall seal.

Figure 48 shows a prior art sidewall seal, toner hopper and cutout toner cartridge attach area.

Figure 49 shows a new and improved sidewall seal in isometric view.

Figure 50 shows a new and improved brace positioning stiffener device for installing a sidewall seal.

Figure 51 shows a prior art shipping seal.

Figure 52 shows an improved version of the prior art shipping seal of Figure 51.

Figure 53 shows a prior art seal-insert, top view.

Figure 54 shows a prior art seal device.

Figure 55A shows the prior art shipping seal installed on the modular seal-insert.

Figure 55B shows at shipping seal assembly.

Figure 56 shows where the seal-insert fits into the toner hopper.

Figure 57 shows an isometric view of the partially pulled shipping seal after it is installed into the toner hopper.

Figure 58 shows a prior art shipping seal and part of the process of installing it into a toner hopper.

Figure 59 shows a prior art shipping seal and part of the process of installing it into a toner hopper.

Figure 60 shows an improved device and process for installing the shipping seal of Figures 58 and 59.

Figure 61 shows an improved device and process for installing the shipping seal of a toner cartridge.

Figure 62 shows an improved device and process for installing a shipping seal of a toner cartridge.

Figure 63 shows a further improved device and process for installing a shipping seal into a toner cartridge.

Figure 64 shows a placement holder device (PHD) used for installing a shipping seal for a toner cartridge.

Figure 65 shows a further improved device and process for installing a shipping seal into a toner cartridge.

Figure 65A shows a further improved device and process for installing a shipping seal into a toner cartridge.

Figure 65B shows an improved device and process for installing a recovery blade seal or any other blade into a toner cartridge.

Figure 66 shows a gang of PHD's, placement holder devices packaged together for ergonomic use.

Figure 66A shows another gang of PHD's, placement holder devices packaged together for ergonomic use.

Figure 67 shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66.

Figure 67A shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66A.

Figure 68 shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66.

Figure 68A shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66.

Figure 69 shows a preliminary step in the continuous manufacture of the placement

holder device of similar to that of

Figure 70 shows a packaging configuration and method of s shipping seal such as that of Figure 62-63.

Figure 70a shows a packaging configuration and method of s shipping seal using the seal-insert of Figure 71a and 71b.

Figure 70b shows a packaging configuration and method of s shipping seal using the seal-insert of Figure 71c and 71d.

Figure 71 shows a packaging configuration and method of s shipping seal such as that of Figure 62-63.

Figure 71a shows a seal-insert page used to manufacture a packaging configuration and method of s shipping seal such as that of Figure 70a.

Figure 71b shows a seal-insert page used to manufacture a packaging configuration and method of s shipping seal such as that of Figure 70a.

Figure 71c shows a seal-insert page used to manufacture a packaging configuration and method of s shipping seal such as that of Figure 70b.

Figure 71d shows a seal-insert page used to manufacture a packaging configuration and method of s shipping seal such as that of Figure 70b.

Figure 72 shows a breakaway view of a shipping seal assembly.

Figure 73 shows a breakaway view of a shipping seal assembly.

Figure 74 shows an isometric view of a prior art PX toner hopper.

Figure 75 shows an isometric view of a PX toner hopper with a seal assembly partially installed.

Figure 76 shows an isometric view of a prior art gasket.

Figure 77 is an isometric view of a gasket assembly with a stiffener and a handle.

Figure 78 is an isometric blown up view of an encircled section of Figure 77.

Figure 79 is an isometric breakaway view of a gasket assembly with a stiffener and handle.

Figure 80 is an isometric view of a gasket assembly with a stiffener and a handle with the release liner partially removed.

Figure 81 is an isometric view of a gasket assembly with a stiffener and a handle with the stiffener and adhesive partially removed.

Figure 82 is an isometric view of a gasket assembly with a stiffener and a handle with the stiffener, adhesive and disposable portion totally removed from the usable portion. Figure 83 shows a prior art top half of a toner hopper.

Figure 84 shows a prior art top half of a toner hopper with pressure-sensitive gasket installed.

Figure 85 shows a prior art bottom half of a toner hopper.

Figure 86 shows a prior art bottom half of a toner hopper with seal assembly installed.

Figure 87 shows an isometric view of a seal subassembly.

Figure 88 shows a seal subassembly installed and being installed on a seal-insert.

Figure 89 shows a seal being removed from a seal-insert assembly leaving the tape on the seal-insert.

COMPLETE DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows a section 1 of a conventional waste toner hopper 2, a component of a toner cartridge as used in laser printers, copiers, facsimile machines, or any other imaging or Xerographic machine. A waste toner hopper 2 is located adjacent the photoreceptor drum 3 as illustrated broadly in Figure 2. After transferring the dry toner image from the drum 3 to the output paper during the printing process, the photoreceptor drum 3 continues its rotation. Residual toner on the drum 3 is in contact with the keeper blade 4 or recovery blade 4 , forming a perfect seal so toner will not leak out of the waste toner hopper 2, yet allowing the toner to fall into the waste toner hopper 2, "keeping" the toner in the waste toner hopper 2 so it can't escape or "recovering" the waste toner in the waste toner hopper 2. That is why it is called the "keeper blade" 4 or "recovery blade" 4. As the drum 3 continues to rotate, the cutting edge 5 of the wiper blade 6 scrapes the residual toner from the photoreceptor drum 3. The toner falls through the slot 7 into the waste toner hopper 2. The scraped-off residual toner cannot leak or penetrate into the rest of the cartridge assembly because of the seal-contact maintained between the cutting edge 5 of the wiper blade 6 and the photoreceptor drum 3. Also, toner, in theory, cannot leak from the waste toner hopper 2 to the remainder of the cartridge assembly because of the existence of the seal provided by the keeper blade 4 against the drum 3.

Some waste toner hoppers 2 are designed so the keeper blade 4 is very tightly pressing against the photoreceptor drum 3. The keeper blade 4 may be tightly pressing against the drum 3 that as the drum 3 rotates, the keeper blade 4 may inadvertently scrape

residual toner off the drum 3 before it is scraped off by the cutting edge 5 of the wiper blade 6 to fall into the waste toner hopper 2. Residual toner prematurely scraped off the drum 3 can leak into the remainder of the toner cartridge assembly and printer, making a mess of other components and affecting the quality of the print on the output paper. Having the keeper blade 4 too tight to the drum 3 may also cause excess friction or heat, in turn causing premature wear or warpage or other deformation of the keeper blade 4 or wear down the drum 3.

A narrow strip of magnet, the pickup magnet 8 of Figures 2 and 14, about one thirty-second of an inch in width in the typical case (although it can greatly vary in different style waste toner hoppers 2), used in some waste toner hoppers 2 attracts some toner when the toner cartridge assembly is pulled out of the imaging machine and moved around and also picks up airborne toner that mixes in the air. Note that Figure 2 shows that the keeper blade 4 touches a thin surface of a pickup magnet 8, and the pickup magnet 8 also may be used to help secure the keeper blade 4 to the attach surface 27 of the waste toner hopper 2 i.e. preventing de-lamination of the keeper blade 4 in which the photoreceptor 3 is continually exerting a force upon the keeper blade 4, in a direction whereby if adhesive is not strong enough, it would cause de-laminating or peeling off of the keeper blade 4, the keeper blade 4 itself acting as a lever, is helped to prevent from levering off because of the existence and position of the pickup magnet 8. Attempting to vacuum the waste toner hopper 2 and keeper blade 4 can kink or otherwise deform or de-laminate the keeper blade 4 causing a leak and/or streak at the end-user's location. Furthermore, the very installation process of the keeper blade 4 can cause a kink and cause a leak or streak at the user's location. With a better device and process of installation of the keeper blades 4 as will be shown in this invention, this problem will be decreased if not totally eliminated. Furthermore, with the improved device of this invention, the

manufacturing process of any style blades 4 themselves can be manufactured easier because a removably adhered installation stiffener positioning device is removably adhered to the keeper blade 4. By giving the keeper blade 4 stiffness, it is easier from a point of view of material handling in the manufacturing process. This includes cutting, slitting, die-cutting, flat die-cutting, rotary die-cutting, flat-rotary die cutting, stamping, or other operation, particularly of the continuous feed variety. Some urethane and plastic keeper blades are so thin that they are very difficult to manufacture without the process and device of this invention because thin urethane can stretch, fold, crease, pinch, wrinkle, tear or otherwise deform.

Figure 3A shows a side view of a plastic bookbinder spring-clip 9 used in prior art to hold the keeper blade 4 when it is being installed. Figure 3B shows an isometric cutaway view of the same prior art spring-clip 9. This spring clip 9 comes from the bookbinder industry and is used in many a school project to hold together reports and other school projects. The spring force of this spring-clip 9 holds the keeper blade 4 for use in the installation process. The problem with the bookbinder spring-clip 9 is that it requires two extra steps in the installation process. First it requires that the keeper blade 4 is placed or installed into the bookbinder clip 9 which is very tedious. Then, the keeper blade 4 is installed into the waste toner hopper 2. Then, the spring-clip 9 is released from the keeper blade 4 and the waste toner hopper 2. The bookbinder spring-clip 9 has been used for quite some time, and after this invention is released, there will be a reduced need if any of the bookbinder type clip 9 for installing keeper blades or other blades. The spring-clip 9 has an opening 50 where the recovery blade 4 is inserted which exerts a spring pressure to hold the recovery blade 4 in the spring-clip 9 prior to installation. Even though the bookbinder clip 9 could become obsolete from this invention, some people may want to use the clip 9 with this invention. Pony clamp adaptations of the spring clip 9 have been

around too in order to facilitate spreading open the clamp for installation of the recovery blade 4.

Figure 3C is prior art in this patent application because it was co-invented in the parent patent of this continuation-in-part. Figure 3C-3D shows a shipping seal assembly 109 which is patent pending by inventor, the parent serial number 08/370,968 of this continuation-in-part. The tear guide 89 provides a pull device for the end-user to pull from the user's location to release the dry toner powder after the tear guide 89 tears the tear material 93. It starts at the slits 91 and completes the tear at the slits 91 where the tail 90 remains. Figure 3D shows a seal assembly 110 from parent serial number 08/370,968 that consists of the same shipping seal assembly 109 but also containing a positioning stiffener 94 for easier installation of the shipping seal assembly 110. The edge remove handle 95 and end remove handles are subcomponents of the positioning stiffener 94 for the purpose of making it easier to remove the positioning stiffener 94 after the shipping seal assembly 110 is installed. Figure 3E shows a prior art from the CIP parent patent toner hopper 97 with an installed shipping seal assembly 110 covering the opening in toner hopper 99, shown after the positioning stiffener 94 was removed. Also shown in Figure 3E is the tear-guide 89 pulled partially which has caused the opening in the seal torn area 98 so that toner powder, previously trapped inside the toner hopper 97, may now fall through the opening 99.

Figure 4 shows the typical imaging system which includes, in theory not only the inner workings of the toner cartridge assembly, but also what goes on in the imaging or Xerographic device as well. Typically, most of the moving parts that can wear or need replacement are kept in the disposable toner cartridge which can be recycled, thus rather than requiring a service technician's round-the-clock availability, a simple replacement of a new toner cartridge replaces the need for a service technician. However, a

remanufactured cartridge made from the toner cartridge that was designed to be thrown away may replace the new toner cartridge. Thus, the toner cartridge remanufacturer, rather than a brand new toner cartridge replaces the need for the round-the-clock service of the imaging device. This way, the servicing is done off-site.

Everything is centered around the photoreceptor 3, which in this diagram is a drum or cylinder. Some photoreceptors are of the belt style and this invention applies to these imaging machines with belt photoreceptors as well, even though it is not shown in the figures. The photoreceptor 3 is initially charged by the primary charge roller or PCR 43. This PCR 43 rotates and supplies a voltage charge to the photoreceptor 3 and in so doing also charges over any residual image charge that may be left over on the photoreceptor 3 from a previous image, and thus, an erase lamp is not required. After the PCR 43 charges the photoreceptor 3, the laser beam scanner assembly 49 hits the drum 3 with an image in the form of pixel dots. Wherever the laser light shines on the photoreceptor 3, discharge of the charge provided by the PCR 43 takes place, forming an image on the photoreceptor 3, of what will be printed or copied. Wherever the light discharges will print black on the output page and wherever the charge is not hit with laser light becomes white. In some machines, the opposite takes place, but the theory would then be the same in reverse with light hitting where there is no image but I will continue only with discussion where light makes black image on the output page. As the photoreceptor 3 continues to rotate, it next comes almost in contact with the developer roller 44 with a very precise space between them which supplies toner to the photoreceptor 3 in the form of the image. Toner jumps back and forth between the developer roller 44 and the photoreceptor 3 many times per second forming a "toner cloud" and the photoreceptor 3 takes what toner it needs and then the developer roller 44 takes back what the photoreceptor 3 cannot use. This process continues in "continuous flow" mode and the toner supply is replenished to the developer

roller 44 from the toner hopper (not shown). In early versions of imaging machines, the toner on the developer roller 44 was metered with a doctor blade (not shown) that scrapes toner and leaves the desired thickness of toner remaining on the developer roller 44 as this toner comes near the photoreceptor 3. Using this technology proved inefficient because, a lot of waste toner or background clung to the surface of the photoreceptor 3 and either wound up as gray background or got scraped off the photoreceptor later in the process to get trashed into the waste toner hopper 2. However, eventually the industry standard changed from doctoring or metering blades to the spreader blade 45, a urethane blade on a frame usually made of metal. The advantage of the spreader blade 45 is that the toner when using the spreader blade 45, as it gets spread, also gets "rubbed" and thereby gets charged. The pressure between the spreader blade 45 and developer roller 44 is very important and also affects darkness of print, toner efficiency and quality. For example, in real life, this would be analogous to taking a balloon, rubbing the balloon on a wool sweater, then placing the balloon on a wall or ceiling surface. In the case of the balloon, the electrostatic charge of attraction between the balloon and the wall or ceiling exceeds the gravitational force on the balloon and, the balloon is suspended on the wall or ceiling. To carry this balloon analogy to imaging and the spreader blade 45, the spreader blade 45 rubs the toner against the developer roller 44, and thereby charges the toner, and is said to increase the triboelectric charge of the toner. Charged toner behaves better than uncharged toner in the imaging process. This is, among other reasons, because the AC component of the bias voltage on the developer roller 44 attracts the toner from the photoreceptor 3 and alternates between attraction and repulsion many cycles per second. When the developer roller 44 repels the toner as it alternates its bias charge polarity, the photoreceptor 3 takes whatever toner it needs. As soon as the developer roller 44 attracts toner again, the charged toner is attracted back to the developer roller 44. The translation of this theory

into real life is that the charged toner behaves as if it is lighter like the balloon. The charged toner is more controlled by the rapidly alternating attractions and repulsions of the developer roller 44 and by the charge an attraction of the photoreceptor 3 than by gravity. Thus, the toner, defying gravity, instead is controlled by electrostatic forces greater than gravity, is less likely to become waste toner that winds up in the waste toner hopper 2. The result of charging toner is that the drum 3 does not keep as much undesirable background toner which would have become background on the output page or waste toner in the waste toner hopper 2. Thus the darkness of the print on the output page is increased while at the same time the toner efficiency is also increased. This seems contradictory for both the toner efficiency and the darkness of the output page each to increase, however, if you think about the theory, it makes sense. Greater detail of this theory has been presented by the inventor in patent number 5,546,162.

As the photoreceptor 3 continues to rotate, after it has passed the developer roller 44, the page-image is now visible on the photoreceptor 3. If one were to turn off the laser printer or copier in the middle of a job, at this position of the photoreceptor, you would see black toner powder on the photoreceptor 3, identical to the image that is to be printed on the page. Furthermore, although I do not recommend doing so, you can wipe this toner off the photoreceptor 3 as it, by attraction, clings to the photoreceptor 3 by attraction of charge where there is image and repulsion where there is no image, similar to the way a charged balloon on the wall is suspended on the wall where the charge of attraction of the balloon to the wall exceeds the gravitational force pulling the balloon toward the earth as discussed. The attraction of all toner particles to the photoreceptor 3 is greater than the gravitational force trying to pull the toner to the ground. So, although the laser light discharges the photoreceptor 3 charge, there is a charge remaining in these "discharged" pixels that is compatible with attracting the toner to the photoreceptor 3. Note that the

dashed lines on the spreader blade 45 are a conductive coating 116 as shown in inventor's patent number 5,400,128 which is an option. Also, optionally, the material such as urethane may be loaded or heavily loaded with conductive material. One typical way to load a blade with conductive material is to use conductive carbon black.

As the photoreceptor 3 continues to rotate even further, it passes simultaneously by the output paper and the transfer charge roller assembly 46. The transfer charge roller assembly 46 charges right through the output page and attracts the toner, imaged on the photoreceptor, which then sticks by attractive charge to the output page. It is because of the fact that the charge placed on and through the paper is the force that attracts the toner, that thick paper and envelopes sometimes have problems. There is a limit on how thick the output paper can be and still receive a quality charge throughout from top to bottom. Similarly, at this point in the process, the toner is attracted to the paper like the balloon stuck to the surface of the wall. Again, if one was to turn off the laser printer or copier in the middle of a job, if you look at the output paper in the region just after the paper went through the transfer charge roller assembly 46, the printed image is on the page in dry powdered toner that can be wiped off the page, in the form of the messy black (or other color of the toner) that can get all over your clothes. The output page then goes through the fuser roller assembly (not shown in diagram), a heat and pressure roller assembly that actually melts or fuses the toner to the output page and literally "glues" the toner to the page in the form of the desired image. This glue is the toner itself when it attains a temperature greater than the melting point of the toner. Toner contains mostly styrene and, thus, behaves similar to a hot melt glue.

As the photoreceptor 3 continues to rotate, there is residual toner that never left the photoreceptor 3 due to inefficiency when it transferred to the paper from the charge of the transfer charge roller assembly. Some of this residual toner is in the form of the page-

image, a faint ghost of the previous image and the rest of the residual toner still on the photoreceptor 3 is mostly background. In the older toner cartridges such as the SX and CX, a doctor blade was used instead of a spreader blade, and thus, there was a large amount of background toner on the photoreceptor 3 that got scraped into the waste toner hopper 2. Some of this toner, because it was so much toner all the time, wound up getting past the scraping wiper blade 6 that the charging corona assembly and wire attracted this toner when charging, and wound up on the wire, eventually insulating the wire, causing a streak known as the right side streak, or RSS, a messy streak or vertical band on the right side of the output page. For this reason, blade embodiments involving spreader blades 45 are very important, especially for converting the SX doctor blade 52 into a spreader blade 45. This residual toner is then scraped off the drum using the cutting edge 5 of the wiper blade 6 and toner is then sealed in the waste toner hopper 2 with the recovery blade 4 (shown in figures 1 and 2). Note that in Figure 4, this wiper blade 6 is optionally coated with a conductive coating 117 as in inventor's patent number 5,400,128, or may be loaded with a conductive material, any conductive material, including conductive carbon black, for improved performance..

Then as the photoreceptor 3 continues to rotate, it goes back to the PCR 43 where charging is done and the cycle repeats itself. It should be pointed out that when the PCR 43 charges the photoreceptor 3, it is not only charging the photoreceptor 3, but is also charging over an electrostatic ghost charge of the previous image. Sometimes when the humidity is low in northern climates when the heat is turned on and the air can be very dry, this electrostatic ghost of the previous image is not completely charged over, and a portion of the previous image is faintly printed on the output page. This phenomenon is called ghosting.

Figure 5 shows a toner hopper assembly 47. On this assembly, one can see in

greater detail the developer roller 44, the spreader blade 45, and the frame 48 that holds the spreader blade 45. Also on the toner hopper assembly 47 is the reservoir 51 which is literally the tank that holds the fresh toner to provide a continuous supply of toner to the developer roller 44. Typically the spreader blade 45 is urethane rubber and one can clearly see how this spreader blade 45 rubs the toner for the purpose of charging the toner. Inventor owns patent number 5,546,162 used to replace worn spreader blades 45 and to put spreader blades 45 on metal doctor blades or other metal blades in a conversion process. In the above patent, that invention can be improved with the installation device of at least 3 embodiments of this invention for easier installation and will be shown.

Each blade in the toner cartridge and imaging machine is important. How a blade functions depends on how many cycles of usage the blade has had. For example, recovery blades 4 can kink either from vacuuming toner from the waste toner hopper 2, from wear, from aging, cycling, or even from the process of installation of a new blade. Typically, in the toner remanufacturing industry and in the service technician industry, these blades are replaced on a regular scheduled basis. Some remanufacturers replace these recovery blades 4 every time they remanufacture the toner cartridge just to be safe. Many remanufacturers replace these blades to keep a certain ISO 9000 or other such quality control status. The same is true of spreader blades 45 and wiper blades 6. Wiper blades 6 are always rubbing against the photoreceptor 3 and scraping it. This is a wearing situation. Sometimes a paper impurity or other particle lodges between the cutting edge 5 of the wiper blade 6 and the photoreceptor 3 and eventually scratches the cutting edge 5 of the wiper blade 6. Sometimes the wiper blade 6 can be under-lubricated or over-lubricated. Sometimes the heat of friction from not properly lubricating the wiper blade 6 can cause wear. Wiper blades 6 have a sharp "cutting edge" 5 that contacts the photoreceptor 3 and literally scrapes off the waste toner. From wear, this sharp cutting edge 5 eventually

becomes a rounded edge. A rounded edge is not going to scrape toner from the photoreceptor 3 and will cause failure in the form of smudges, smears, leaks and streaks. Another problem of wiper blades 6 is that they can tend to "bend backwards" or "flip" from friction causing heat cycling which causes material weakness in time. These various wiper blade defects are described in greater detail in inventor's patent number 5,308,515 for a "METHUSELAH" brand drum padding powder which is intended for use on photoreceptors 3, wiper blades 6, spreader blades 45, recovery blades 4 and any other blade involved in the imaging process. Spreader blades 45 tend to wear from repeated use. Because a spreader blade 45 is continually rubbing the toner and generating friction which generates heat, they can sometimes wear quicker than desired.

So, replacement of all blades in the imaging process which includes all imaging machines is critical in obtaining perfection in the imaging industry whether it be remanufacturing toner cartridges or servicing an imaging machine. For service technicians, the CPC (cost per copy) or CPP (cost per page) is critical when obtaining and keeping service contracts. Thus, this invention can be used to keep up the good quality and reduce the CPC and maintain ISO 9000 type standards. If you look at the bend of the spreader blade in Figures 4 and 5, you can see a spring force exerted onto the spreader blade 45 by on the photoreceptor 3.

Figures 6A and 6B shows a prior art recovery blade 4. This recovery blade 4 has a top surface 13 and a bottom surface 10. It has tape or adhesive 11 and a release liner 12 that is peeled away to expose the pressure-sensitive adhesive. Figure 6C shows the first embodiment of this invention, a recovery blade 120 with an extra portion of adhesive liner 118 that sticks out at the easy-pull tab 119 for ease of removal of the release liner 118. This portion of release liner 118 that protrudes has no adhesive on it. This easy-pull recovery blade 120 has a bottom surface 121.

Figures 7A through 7D show another embodiment of this invention, the recovery blade assembly 25, 25A, 25B and 25C. These recovery blade assemblies 25A and 25B have a recovery blade 17A and 17B with a top surface 18A and 18B and a bottom surface 16. They have a pressure-sensitive adhesive/tape 14 with a peelably removable release liner 15. These recovery blade assemblies 25A and 25B also have a stiffener or positioning device 20A and 20B that is removably adhered with adhesive or tape 19. The positioning device or stiffener 20A, 20B and 20C is used to hold the blade rigid so it will not wrinkle, will not adhere where not desired, will adhere where desired and so that the blade will be kept rigid, to set the installation position, to prevent pinching of the blade 25A to 25C, to make the blade easier to grab so an installation tool is not required, to support the blade 25A to 25C, to brace the blade 25A to 25C, to reinforce the blade, to maintain blade width, to act as a blade stabilizer, to act as a blade splint, a support means, installation device, positioning device, and a device to join the blade to its waste toner hopper 2. These positioning device stiffeners 20A and 20B have bottom surface 23 and a top surface 24. The adhesive/tape 19 of the stiffener 20A and 20B has a top surface 22 and a bottom surface 21. The top surface 22 of the adhesive/tape 19 is in surface to surface contact with the bottom surface 23 of the stiffener 20A and 20B with the intention of permanent adhesion. The bottom surface 21 of the adhesive/tape 19A and 19B joins the recovery blade 17A and 17B at its top surface 18A and 18B whereby this surface to surface adhesion is intended to be removable. There exist tapes and adhesives that are permanent-removable whereby one surface is to be permanently adhered and the other surface of the adhesive is intended to be removable. One good example of such an adhesive that is seen commonly in everyday life is the POST-IT note whereby the adhesive is permanently adhered to the POST-IT note and removably adhered to whatever the end-user posts it to. This is similar to a type of adhesive 19 that is preferred for adhering the

stiffener positioning device 20A through 20C to the recovery blade 17A, 17B and 17, respectively, whereby the adhesive sticks permanently to the bottom surface 23 of the disposable stiffener 20A, 20B or 20C and removably adhered to the top surface 18A and 18B of the recovery blade 17, 17A, 17B, or 17C of this first embodiment. Figure 7B and 7C differ in that Figure 7B has a disposable stiffener 20A that is the same width as the recovery blade 25A while Figure 7C has a disposable stiffener 20B that is wider than the recovery blade 25B for more userfriendly use in certain applications. The disposable stiffener 20B that sticks out and is easier to install and does not require a knife or similar tool to separate the stiffener 25A and the adhesive 19A from the recovery blade 17A. To be even more userfriendly, Figure 7D shows a recovery blade assembly 25C where the adhesive protective release liner 15C has a protrusion with no adhesive for easier removal of the adhesive/2-sided-tape/glue line 15C.

This embodiment of the recovery blade assembly 25 is very easy to install. First peel away the release liner 15 thus exposing the pressure sensitive adhesive 14 that is joining the bottom surface 16 of the recovery blade 17 as in figure 8. Once the release liner 15 is removed, the remainder of the assembly 25 is shown as 26 in Figure 9. After peeling off the release liner 15 as in the figure 8, then hold the recovery blade assembly 26 with two hands as in Figure 9. Then place the recovery blade assembly 26 on the waste toner hopper attach surface 27 on the waste toner hopper 2 as shown in Figure 10. The bottom surface 21 of the adhesive/tape 14 is to attach to join to the attach surface 27 of the waste toner hopper 2. Then this recovery blade assembly 26 is to be pressed on the waste toner hopper 2 and is to be rubbed, pressed on or burnished. A burnishing tool may be optionally used. I usually just use my fingertips, but for full scale production, a burnishing tool is preferred, a small flat tool with a handle, where the pressure width matches that of the adhesive width on the stiffener 20 or the recovery blade 17. In Figure 11A, the

recovery blade assembly 26, already is installed and pressed on and then the positioning device stiffener 20 and the permanent-removable tape/adhesive 19 are started in separation/de-lamination from the recovery blade 17 using a sharp edge such as a blade, knife blade, razor blade, fingernail, thumbnail, piece of metal or other edge. Of course at a greater manufacturing cost this assembly 25 could have been made with stiffener edges that protrude for easy peeling such as that of Figure 7C. Figure 11B shows an easy-pull recovery blade 17D whereby the removable disposable stiffener 20D has an easy-pull protrusion 113 for easy ergonomic removal of the disposable stiffener 20D. Figure 12 shows the removably adhered stiffener 20 being peeled away like a banana peel exposing the top surface 18 of the fully installed recovery blade 17D.

Please note the difference between the recovery blade assembly 25A and 25B. Recovery blade assembly 25A is easier to manufacture because the stiffener 20A is identical in width to the 2-sided-tape/adhesive/glue 19A and can be slit in one easy step simultaneously. The stiffener 20B of assembly 25B, on the other hand, is wider than the 2-sided-tape/adhesive/glue 19B and thus can not be slit in one easy simultaneous step, requires another step and is therefore more expensive to manufacture. However, the recovery blade assembly 25B has a major advantage over the recovery blade assembly 25A. Now, and this is an important feature of this embodiment that because the recovery blade assembly 25B has a wider stiffener 20B which protrudes beyond the 2-sided-tape/adhesive/glue and beyond the recovery blade 17B, it forms an easygrab protrusion 113. Thus, when the installer removes the stiffener 20B and tape 2-sided-tape/adhesive/glue 19B from the recovery blade assembly 25B, the preferable pull layer 113 sticks out for easy grabbing for easy removal. As stated, the 2-sided-tape/adhesive/glue 19 prefers to stick permanently to the stiffener 20B and prefers to de-laminate from the recovery blade 17B after a pulling force is exerted upon the stiffener

20B for easy de-lamination removal of the disposable stiffener 20B. The disposable stiffener 20A is removed similarly, but there is not an easygrab protrusion 113 and thus the recovery blade assembly 25A requires a knife as in Figure 11A and, is not as userfriendly as the recovery blade assembly 25B, but costs less to manufacture.

Please note that in the embodiment of the recovery blade assembly of 25B, although the geometry of the easy grab protrusion 113 sticks out on one particular side, there is no limit to the possibilities of this easy grab protrusion 113. This easy grab protrusion 113 can stick out of one side as shown in Figure 11B, the other side(not shown), both sides(not shown), more to one side than the other side, or any physically possible configuration or combination.

The keeper blade 4 is made of either a thin, stiff plastic or a thin resilient rubber material from three to twenty thousandths of an inch thick. The plastic may be acetate, MYLAR, polycarbonate, polyester, PETG, vinyl, or other stiff plastic. The rubber material may be urethane rubber, neoprene rubber, or other variety of either a rubber or other elastomeric material. Note that there can be any number of no-adhesive/no-tape regions and/or grab protrusions anywhere on the stiffeners 20A and 20B. The possibilities are limitless and this is an important part of this invention. Note that inventor owns patent number 5,479,250 where the keeper blade 4 is conductive. According to that patent, the keeper blade may either be made of conductive material or otherwise coated with a conductive coating.

Figure 11C is an embodiment of a recovery blade assembly 206 that is one of the best embodiments of this patent application. This important improvement is not only very userfriendly, but is also preferred because it is easy to manufacture in mass production. This ergonomic recovery blade assembly 206 has a left side 212 and a right side 213. This recovery blade assembly 206 has many layers consisting of an adhesive release liner 207, a

pressure-sensitive adhesive/2-sided tape/glue 208, the recovery blade 209, an adhesive/2-sided-tape/glue 210 that is intended to stick permanently to the stiffener/support 211 and removably adhered to the recovery blade 209, and a removably adhered support, stiffener, positioning device 211, which may be removably adhered with its glue 210 from the recovery blade 209. An interesting point about this recovery blade assembly 206 is that it is easy to manufacture and very ergonomically easy to install both at the same time. The base materials can be normally laminated adhesive 208, liner 207, recovery blade 209, preferential adhesive 210 and the stiffener/support 211. This lamination and slitting can be performed very simply with substeps. The first step would involve lamination of the stiffener/support 211 to the preferential adhesive/2-sided-tape 210 to the recovery blade 209 material. These materials can be triple laminated in wider than the used width for example 10 inch rolls, with the tape 210 in the middle and the stiffener 211 materials on one surface and the recovery blade 209 material on the other surface. Then in the second step, this material can be simply slit to the correct width. Then in the third step, the adhesive/2-sided-tape 208 with liner 207 can be laminated on to the result from step two, each in proper width. This resultant material may be stored in rolls or may be stored in cartons ready to be cut. In the cutting step, two operations are performed. The length cut is made where the left end 212 of one assembly 206 joins the right end 213 of an adjacent piece to cut to precise length. Also, in the cutting operation, a kiss-cut or double-kiss-cut 220 or other multiple kiss-cuts through the tape 208, liner 207, and recovery blade 209 at location 220 as seen in Figure 11C. Optionally, a fold or crease can be made at location 220 to bend the recovery blade assembly 206 for userfriendly use after or before the kiss-cut at location 220. This forms a handle 214 on the recovery blade assembly 206 where the handle is the region located between the kiss-cut 220 and the right side 213 which may have a crease or fold or the user may fold it before assembly. This handle can be bent or

folded on the kiss-cut 220 to form an easygrip handle that is not only easy to use, but after installation of the recovery blade assembly 206, the installer simply pulls the recovery blade handle 214 and peels off the entire stiffener/support 211 and preferential tape 210 by simply grabbing and pulling the handle 214 and peeling the stiffener 211 and preferential tape 210 like peeling a banana peel. This device totally obsoletes the recovery blade holder tools 9, for example, and eliminates the extra steps involved in using the tool 9. When peeling off the 2 layers 210 and 211, the recovery blade 209 stays attached to the waste toner hopper 2 while the two layers are removed. As the handle 214 is pulled to remove the 2 layers 210 and 211, from the recovery blade assembly 206, the handle 214 stays attached to the disposable remains of the recovery blade assembly 206, in all its layers 215, 216, 217, 218 and 219. This is not only the recovery blade of the future, but is also the blade of the future, because it is so easy to make any blade this way, from a manufacturing point of view. It would have made sense to use the versions of Figure 7B or 7C, however, the embodiment of Figure 11C is not only easier to use, but it is also easier to manufacture in mass production. The fold or crease at 220 is optional because the installer can be instructed to fold the assembly 206 at the kiss-cut 220 as a part of the installation instructions. Creasing or folding at 220 can be done as a separate step to make the process easier, but there is also another optional way to simplify the crease or fold. If the kiss cut goes deeper than shown in Figure 11C, through the adhesive 210 and partway through the stiffener support 211, then this kiss cut into the stiffener support 211 and will form a natural bend line for folding. Thus, the crease or fold step in the handle 214 at the kiss-cut 220 can be optionally eliminated. This can be important because the folding/creasing operation would require a step additional to the kiss-cut 220 in another operation. It should be pointed out that this inevitable ergonomic, userfriendly embodiment shown in Figure 11C may be used not only for recovery blades and other strip

blades, but may also be used to install spreader blades and wiper blades. One important feature of this most ergonomic recovery blade 206 is that the recovery blade 209 may be made of any material, preferably a plastic or rubber, urethane rubber, MYLAR, acetate, PETG, polycarbonate, vinyl or any other material. However, one difficulty exists in the typical case in cutting, slitting and placing adhesive on ultra thin urethanes below .010 inches. The material wants to stretch and deform. Now, and this is an important point that the thin urethane or other elastomer may be simply laminated, slit and otherwise worked with in this embodiment easily, because the stiffener support 211 provides a support to the ultra thin elastomer 209 so that the elastomer can be easily slit in a sandwich of 209, 210, and 211 without concern about stretching the ultra thin elastomer 209 while working with it. Without the stiffener support 211, it would be very difficult to cut narrow strips of very thin elastomeric materials without stretching or otherwise deforming these materials, which would make a wavy recovery blade 209 which would cause a defective waste toner hopper 2 of a toner cartridge causing the "sprinkle dot streak", a vertical band of dots on an output page caused by a kinked, wavy, or otherwise defective recovery blade 209. Also, this idea, good for installing strips of any kind, may be used in other industries and is a first of a kind, a pioneer patent. This idea may be used for stiffening and supporting any flexible or thin material for any purpose of any industry for easy installation. It could be used in the automotive industry, electronics, construction, camping, carpet industry, or any other industry or use. Of course, the liner 207 and adhesive 208 could be any width whatsoever, including being as wide as the blade 209. There may be applications in some industries where a strip needs to be installed in a precise way or quickly and this device and method could be used to prevent the tape on the strip from crinkling and wrinkling and to give the tape or strip a longitudinal supportive rigidity as tape, whether on a strip or not likes to stick to itself and everything else, and this can provide a simple way to install

the tape or strip with greater speed, accuracy, efficiency, reliability, wrinkle-free, with greater ease. This embodiment could be used for installing gaskets, flexible foam material, flexible foam rubber material, die-cut materials and can be designed to fit the contour of any shape to install anything that uses adhesive, 2-sided tape or glue. This device could become another way of packaging strips of any kind for special use requiring greater positioning control.

Figure 13 shows another embodiment of this invention. This is a packaging method, manufacturing method and device for ergonomic re-assembly of a new replacement pickup magnet 8 as a sheet 33 of strips 8. Figure 14 shows the installation of the pickup magnet 8 after installation of the recovery blade 17 is completed. This pickup magnet 8 helps prevent messes from occurring when moving toner cartridges around after the shipping seal is opened. This pickup magnet 8 shown being installed in Figure 14 also helps keep the recovery blade 17 from de-laminating from the attach surface 27. Inventor has manufactured magnetic strips in single strips, each with its own release liner for over 5 years and manufacturing this has been very tedious, difficult and required great patience. Then, inventor came up with the idea of the pickup magnet sheet assembly 33 shown in Figure 13 where the pickup magnets 8, rather than each magnet 8 individually cut are instead kiss-cut on sheets, each pickup strip 8 on a sheet sharing the same release liner 34. When the die-cutting is performed, the die cuts through the flexible magnetic material 31 and also cuts through the tape/adhesive 30 but does not cut through or cuts through very little of the release liner 34 shared by the entire sheet of pickup magnets. With this innovation 33, manufacturing of the pickup magnets 8 is much less costly and also the pickup magnet sheet assembly 33 is ergonomically more easy for a production person to use. It is easily peelable, easy to grab, does not require the difficult task of pulling a very narrow and thin release liner for each pickup magnet 8, saves lots of time in installation to

the pickup magnet attach surface 28 on the waste toner hopper 2. With this innovation of the pickup magnet sheet assembly, packaging of pickup magnets 8 is much easier and also less costly to manufacture. This pickup magnet is simpler to manufacture than anything in prior art. The sheet of flexible magnet material with laminated adhesive/2-sided tape 30 is die-cut as a kiss cut so as to cut through everything but the release liner 34. After the die cut, since the magnetic strips are very narrow
in width, around 1/32 inch as well as thin, the flex magnet material deforms and develops a longitudinal bow for its entire length. The ratio of die blade to material cut (in thickness) is high, and that is what causes the longitudinal bow. The inventor's solution to this longitudinal bow is to run the die cut sheet 33 through a roller, or a pressure-roller, optionally/preferably with heat and the longitudinal bow is gone. After testing and research, it was found that this heat-pressure flattening process is not detrimental to the material and also is not detrimental to the magnetic field strength. From such a heat-press deformation, in the worst case, magnetic strength could be decreased by around five percent of the original magnetic strength. For this reason, the deformities generated when die-cutting the pickup magnet sheet assembly can be corrected with heat-pressure rolling, flattening out the magnetic material beautifully.

Another embodiment of this invention is another very ergonomic recovery blade assembly 35, shown in Figure 15A and 15B. This blade assembly 35 has infinite possibilities on how it can be made. The diagram in Figure 15A and 15B is just one mere example of this embodiment, although the possibilities are limitless. The recovery blade 40 has an attachment tape/adhesive 41 for attachment to the attach surface 27 and a protective release liner 42 that protects the tape/adhesive 41 prior to use. In a similar way as the procedure of Figures 7A through 7D and Figure 11C, a permanent-removable tape 39 attaches on the removable side to the recovery blade 40 and on the permanent side to

the positioning stiffener device 36. The positioning stiffener support device 36 can optionally have flaps of regions with no adhesive for easy and quick removal after installation is done. For example, any number of partial length removal flaps 37 may be installed on either sides as in the figures, or may be installed on the ends (not shown). The partial length remove flap 37 is not required to be in the center, may have any number of flaps 37 located anywhere on the support 36, nor is it required to be symmetrical nor is it required to be as long as 37 in Figure 15B. There is the long remove flap 38 that may even optionally be full length. This long remove flap 38 also has no adhesive at the grab area just like the partial length remove flap 37. Thus after the recovery blade is positioned and installed, the installer may pull on either remove flap 37 or 38 or a similar one in any location to remove the positioning device ergonomically and not requiring using a knife or razor blade as in Figure 11A. It obviously costs more to manufacture the ergonomic recovery blade 35 than it does to manufacture the recovery blade of Figures 7A through 7C and Figure 11C, and these costs will determine the worthwhileness of this embodiment of this invention. Please note that any positioning stiffener device of this invention whether the simple one 20A through 20D, the easygrab one 211 or the ergonomic one 36, or any other versions later mentioned in this invention or others similar with the same general idea may be made of any material. However, preferred materials are plastic, metal, cardboard or rubber. Stiff or rigid material is preferred. Of the plastic and rubber materials are, just to name a few, polycarbonate, LEXAN, PETG, polyester, MYLAR, acetate, vinyl, hard rubber, fiberglass, plexiglass, or any other plastic. It should also be pointed out that use of clear material such as clear or semiclear plastic for the positioning stiffener 36 allows the installer to visibly see and inspect the glue/adhesive line when necessary for more precise positioning by the installer. Also, a glue type containing pigment, die or other coloring may be used for enhanced view through plastic of the glue line. In some applications this may be important and in others it is not. For such a see-through stiffener, a transparent or semitransparent semipermanent glue/tape/adhesive is desired and such

materials are available. Visibility of the glue line is important when converting an SX doctor blade 59 of Figure 16 into a spreader blade 107 shown in Figure 17.

Figure 16 shows a prior art doctor blade 52 of the SX toner hopper 47 (Figure 5). This metal framed electrically charged doctor blade 52 was designed to literally scrape or doctor the toner from over the developer roller 44's surface to control the thickness of the toner on the developer roller 44 and thereby control both the amount of toner used and the relative page darkness. Figure 17 shows this same doctor blade 52 with a urethane spreader blade 106, thus converting the doctor blade 52 into a spreader blade assembly 107. A method of doing this conversion is shown in inventor's patent no. 5,546,162. Figure 20 shows the spacer 108 located on the bare metal portion of the doctor blade 107 from the patent. The spreader blade 106 is also shown cutaway. The purpose of the spacer 108 was to prevent the metal doctor blade 52 from bowing, warping or curving when tightened down with holding screws (not shown) that go through the holes and the spacer's 108 hole. Although this is all described in inventor's patent number 5,546,162, inventor has found a better way to do the job of inventor's patent without requiring the use of the spacer 108. Before showing the next embodiment that does not require the use of the spacer 108, it should also be pointed out that Figure 18 shows a prior art spreader blade assembly 102 for the LX toner hopper 97. The metal assembly frame 101 is used to structurally support the urethane spreader blade 102. Figure 19 shows the NX spreader assembly 103 with the metal frame 104, and the urethane spreader blade 105. Figure 21A shows the new and improved installation jig 53 for use in assembly of the spreader blade embodiments of this invention. The doctor blade frame 52 is first placed in the installation jig 53 as depicted in Figure 21B in exploded form. The end holes 58 of the doctor blade 52 are lined up with the jig pins 54 to properly place the doctor blade 52 in the jig 53 for installation of the spreader blade 63 shown cutaway in Figure 22. Figure 23 shows that the jig 53 has end stops 57 for accurate placement of the spreader blade 63 onto the doctor blade 52. The jig also has a step 222 from the jig 53 lower ledge 55 to the jig upper edge

56, so that the surface of the jig upper ledge 56 will be contiguous with the spreader blade bottom surface 224. After the invention that was out in the patent 5,546,162, it has been found that three things are important in proper installation of the spreader blade 63 onto the doctor blade 52. First, Figure 23 shows the accurate placement of the left corner mark 74 of the spreader blade 63 into the left corner mark 73 of the jig 53. Thus the side edge stop 57 of the jig 53 must line up with the edge 115 of the spreader blade 63. Second, it has been also found that the glue line 71 of the spreader blade 63 must also align with the back edge 59 of the doctor blade 52. Third, the right side must similarly align which will be shown in the procedure described for accurate positioning of the spreader blade 63 onto the doctor blade 52. The step by step procedure of this embodiment will be described. Once the doctor blade 52 is placed in the jig 53, as in Figure 21B, then peel the release liner 64 of the spreader blade 63 as shown in Figure 22. Then align the left corner mark 73 of the jig 53 with the left corner mark 74 of the spreader blade 63 and press in one spot only as shown in Figure 23. Press so that the adhesive is only stuck in a small region near the jig left edge stop 57 so that the rest of the spreader blade 63 can be properly positioned using the rest of the procedure being outlined. Next, pull the end of the spreader blade 63 as shown in Figure 24 and stretch if necessary until the hole of the spreader blade 66 fits into the jig pin 54. Then press down on this positioned subsection. Next, without stretching the urethane rubber spreader blade 63, lay down the spreader blade 63 as shown in Figure 25 for about 75 to 80% of the length of the spreader blade 63 as shown in Figure 25. It is important that the glue line 71 of the spreader blade 63 aligns along the back edge 59 of the doctor blade 52. Otherwise, toner powder can migrate under the spreader blade 63 and de-laminate the adhesive/glue/tape 65 under the spreader blade 63. Glue with die, coloration, or pigment may be used for easier view of the glue line 71. After smoothing down the amount layed down of the spreader blade 63 so far as in figure 25, it is now important to position the right corner mark 72 of the spreader blade 63 with the right corner mark 75 of the jig 53. Then press this portion down up to the right edge 57. Then,

Figure 26 shows the pulling of the right end of the spreader blade, and stretching if necessary, until the hole 66 of the spreader blade 63 fits over and into the jig pin 54. It is important that everything be smoothed down at this point so that the glue/adhesive/tape 65 of the spreader 63 can take hold. After completed, the new modified doctor blade 77 with spreader blade 63 should be pulled out of the jig 53 and is shown 77 in Figure 27. The glue line 67 is along the metal blade back edge 59 as well as is possible for best results. In a spreader blade assembly 77, the glue line 67 position is more important than the position of the spreader blade back edge 81 which is opposite from inventor's patent number 5,546,162. The spreader blade front edge 82 position is not critical as is the glue line 67 position. Also, while patent number 5,546,162 used washers 108 to prevent warpage from tightening down converted spreader blade assembly 107, this spreader blade 63 has longer ends to prevent glue de-lamination with holes 66 in the spreader blade 63 to accommodate the holes 58 in the SX doctor blade 52 so that tightening down the screws to tighten the completed spreader blade assembly 77 will not warp the metal doctor blade 52 which would cause problems.

Another embodiment of how to install the spreader blade 78 using this jig is shown in Figure 28A and 28B. This embodiment involves a simplification of the steps involved in Figures 21B through 26 and achieves the same end result shown in Figure 27, a doctor blade 52 with a spreader blade 63 installed to form a completed spreader blade assembly 77. This embodiment is similar to the recovery blade embodiment shown in Figure 15A through 15D. Figures 15A through 15D, 28A and 28B use the same concept for a different result. One is for installation of a recovery blade 40 while the other is for installation of a spreader blade 78. Figures 28A and 28B show a good example of where a removably adhered preferably non-opaque stiffener/positioning support device 79 can help the installer see that the glue line 67 is properly in position. Glue/adhesive/2-sided-tape 65 with color helps the glue line 67 stand out to make installation easier. To install this version, place the doctor blade 52 in the jig 53 as before. Then remove the release liner 64

of the spreader blade adhesive/glue/2-sided-tape 65. Then grab the removably adhered positioning device 79, optionally using the remove-flap 38 and/or any of the partial length remove flaps 37 to accurately position the spreader blade 78 onto the doctor blade 52. After everything is properly positioned and if the positioning device 79 is either transparent or semitransparent with the adhesive/glue/2-sided-tape 80, then firmly press everything down and burnish, rub, or press it on so that the glue/adhesive/2-sided-tape 65 will hold the spreader blade 78 to the doctor blade 52. When installation is complete, the stiffener/positioning-device 79 may be peeled away like a banana peel with its removable tape 80. The adhesive/glue/2-sided-tape 80 is an adhesive similar to a POST-IT note which is to stick permanently to the stiffener/positioning device 79 and removably adhered to the spreader blade 78. Thus the adhesive/glue/2-sided-tape 80 has properties where it is removable from the spreader blade 78 and will stay stuck onto the stiffener/positioning-device 79. Thus, the installer, who does not need to be an expert at adhesives simply pulls the positioning device/stiffener 79, and both the stiffening device 79 and adhesive/glue/2-sided-tape 80 peel off with the disposable stiffener/positioning-device 79.

Note that a version of a spreader blade assembly similar to the recovery blade assembly 206 of Figure 11C could be made. Please note that the new and improved shape of the spreader blade 63 of this invention differs from that used in the previous patent 5,546,162 of inventor. By increasing the length of the blade 78, as opposed to that of Figures 17 and 20, a one-piece installation was achieved not requiring washers 108 (Fig 20). However, it has also been learned by hard knocks by inventor that the same result of preventing de-lamination on the ends could have also been achieved by cutting either notches or holes in the spreader blade 63 or 78. Figures 29A-32 show some of the examples on how to prevent de-lamination of the spreader blade 63 or 78 from the doctor blade 52 using notches, zigzags, holes, protruded area, or other shape. One idea is to increase the edge-length of the blade. Optionally, glue may be applied to better hold down the end of the spreader blade 63 or 78. The quickest way to glue is to use a hot melt glue

gun.

Figures 28C and 28D show another preferred spreader blade assembly 225, an ergonomic spreader blade assembly. This spreader blade assembly 225 is very easy to install, because there is a positioning support stiffener 230 that keeps the assembly rigid when installing onto a doctor blade frame 52 or other frame. The positioning stiffener support 230 also makes this embodiment easier to install, because instead of the elastomeric spreader blade 63 being pliable, stretchable and exhibiting other properties typical of elastomeric materials, the elastomeric version of the spreader blade 228 is kept supported and rigid and workable (slittable, cuttable, laminatable, manageable) when being manufactured (and when installing) resulting in higher product yield, making it easier to manufacture, quicker to manufacture, may be easily slit, may be easily laminated, may be easily produced, all using techniques of continuous flow automation or semi-automation manufacturing processes. This is similar to the recovery blade assembly 206 (Figure 11-C), but instead is a spreader blade, not a recovery blade. This device is not required to be elastomeric, even though most spreader blades are elastomeric, it may be made of any material mentioned anywhere in this patent, for example, MYLAR, polyester, polycarbonate, or any other material whatsoever, although elastomeric blades seem to work best.

The spreader blade assembly 225 consists of a layer of positioning support stiffener device 230, preferential adhesive 229 that adheres better to the positioning support stiffener 230 than to the spreader blade 228, 2-sided-tape/adhesive/glue/transfer-tape 227, a release liner 226 (optional), and also has an easy-grip handle 235 located on the right side 234 of the spreader blade assembly 225. There is a left side 233, two holes 231, and a hole not unlike a square in shape 232, a back kiss-cut region 236 and a front kiss-cut region 242. To the left of the kiss-cut regions 236 and 242 is the spreader blade region 243 of assembly 225. To the right of the kiss-cut regions 236 and 242 is the easy-grip handle 235 on the right side 234 of the assembly 225. The easy-grip handle 235 has an

adhesive liner 237, an adhesive layer 238, a spreader blade layer 239, a preferential adhesive layer 240 and a positioning support stiffener layer 241. Note that the stiffener layers 241 and 230 are contiguous and connected in most versions of this embodiment as is the preferential adhesive 240 and 229. This allows for easy peeling of these two layers 229 and 230 when installing the assembly 235. Optionally, the installer can bend the assembly at 236 and 242 area for easy installing the assembly 225 can be installed by having the installer bend the assembly 225 at the kiss-cut region 236 and 242, or the assembly 225 optionally does not need to be bent at all. When manufacturing, a bend or crease can be placed in the kiss-cut region 236, 242. Another option is to kiss-cut in the kiss-cut region 236 and 242, a little deeper, possibly cutting through either the preferential adhesive 229 and 240 and/or the positioning support stiffener 230 and 241, cutting through either/or both either partway or all the way. By cutting part way through the support stiffener 230 and 241, a natural place for an easy fold is generated for easy installation. To install, first remove the adhesive liner 226, thus exposing the adhesive 227. Place the doctor blade 52 onto the jig 53 as in Figure 21B. Then attach the remainder of the assembly 225 on the doctor blade 52, preferably when the doctor blade 52 is located in the assembly jig 53, similar to the embodiments described using the jig 53. When installing, make certain that the left edge blade 244 and right edge blade 245 of the spreader blade assembly 225 are perfectly flush against the stops 57 of the jig 53. With the stiffener support 230 providing structure to the spreader blade 228, the glue line 71 will be appropriately in place, as will be the left side blade 244 and the right edge blade 245, whereby it should install properly no matter who installs it. The only concern with doing the installation this way is that if the glue 227 is not manufactured straight and proper on the spreader blade 228, then it will be difficult to get the glue line 71 in proper place when installing. By using clear or semiclear glue/2-sided-tape 229 and clear or semi-clear plastic for support stiffener 230 and optionally a colored adhesive 227, it is easier to verify visually that installation is going right, that the glue line is properly positioned. Then press

down the recovery blade assembly 225 or burnish it so that the adhesive/tape/glue/2-sided tape will adhere well. Then grab the handle 235, and peel off the support stiffener 230 and 241 as well as its adhesive 229 and 240. When so doing, all layers 237, 238, 239, 240 and 241 of the handle 235 may stay together without de-laminating them. That is why this embodiment 225 is so simple to manufacture, because it can all stay laminated, but simply kiss-cut. Optionally, the handle can be bent prior to installing. When manufacturing the assembly 225, it may be cut in continuous flow processes because of the simple design.

The Figures 29A through 32 show alternate ways of adhering the spreader blade 63 to the metal frame to be attached. Problems to be overcome are toner migration under the glue causing de-lamination of the spreader blade 63 and other causes of glue de-lamination. Once the glue de-laminates, the spreader blade 63 is destined for failure. A spreader blade 63 of Figure 22 may work for a metal frame 52 designed without a spreader blade 63 such as the SX toner cartridge, on the verge of becoming obsolete. Other cartridges such as the LX spreader blade assembly 100 of Figure 18 and the NX spreader blade assembly 103 of Figure 19 may not be so forgiving as well as the most popular in 1997 EX spreader blade (not shown). The blade has a limited amount of room to expand beyond the OEM dimensions of Figures 18-19 because there is a felt endseal that blocks the use of the spreader blade lengthening as the one represented as 63 in Figure 22. The endfelt position physically limits the position of the spreader blade in many types of toner cartridges. Without using the style as the spreader blade 63 of Figure 22, some compromise had to be made over the preferred choice 63. Consequently, an alternate design and method had to be developed and is shown in Figures 29A through 32. These spreader blades 63A through 63F may optionally be enhanced with glue, adhesive hot melt glue added after installation, SuperGlue, conductive SuperGlue, or other enhancement. The styles of Figures 29B and 29C, spreader blades 63B and 63C do not need any enhancement, and so, are more userfriendly to install when enough room is available in the toner hopper.

Figure 29A uses a simple notch 124 cut into the glue area 130 of the spreader blade 63A. Figure 29B shows a simple partial protrusion 125 of the glue area 130 to prevent de-lamination and toner migration under the glue/tape 130 of the spreader blade 63B. This is a preferred embodiment of the figures 29A through 32. Figure 29C uses a full width protrusion 126 that matches the width of the glue 130 width on the spreader blade 63C. Figure 30 shows a spreader blade 63D that has multiple slots or notches 127 on the ends of the spreader blade 63D. Figure 31 shows a spreader blade incorporating multiple triangular notches 128 at the ends of the spreader blade 63E over the glue area 130. Figure 32 shows endholes 129 located near the ends of the spreader blade 63F that can be filled with glue or adhesive such as a glue gun or hot melt glue after installation for further support. Thus, a method and device has been developed that is alternate to the spreader blade 63 of Figure 22 that can operate in an environment where there is limited length in which to place the end portions of the blades where additional adhesion can be achieved to avoid de-lamination and toner migration under the spreader blades 63A through 63F.

Figures 33A and 33B show the same concept of the stiffener 86 removably adhered to a wiper blade 83 for positioning the wiper blade 83 to the metal frame structure 84. The principle is the same as that of Figures 28A, 28B, 15A and 15B only this time, the wiper blade 83 is being installed rather than a recovery blade 40 or a spreader blade 78. The Figures 33A and 33B show a disposable stiffener device that is removably adhered to the wiper blade 83 using an adhesive 87 that sticks permanently to the stiffener device 86 and removably adhered to the wiper blade 83. The wiper blade 83, in turn, has a permanent or semipermanent adhesive/tape/2-sided-tape/glue 85 that adheres it to the metal frame structure 84 that holds the wiper blade 83 when in use. This positioning stiffener removable device 86 has optional holders 37 and 38 for easy removal and creases and/or folds for easy removal.

Figure 34 shows the seal assembly 109 of Figures 3C in greater detail. The protective liner 132 of the seal assembly 109 is being removed for installation. A slot 131

or a non-adhesive center 131 is shown where toner will fall through after the tear-guide 89 tears the tear material in a controlled width as shown in Figure 3E. Figure 35 shows one way the seal assembly 109 is installed into the toner hopper 97. Different construction varieties will now be presented.

Figure 36 can be depicted either of two ways in one Figure. In the first approach of Figure 36, there is a tear material 135 with a tear guide 89 which is adhered to its centerline strip 136 which is a subassembly 137 of a shipping seal 109 of Figure 34. When the tear-subassembly 137 is attached to a seal insert 138 from Figure 38A by removing the adhesive top protective liner 144, thus exposing the top adhesive, the tear guide 89's centerline strip 136 is placed over the slot 139 of the seal insert subassembly 138. The tear-guide 89 guides the tear of the tear material 135 to assure that the tear width will not be narrower than the width of the tear guide 89 at the centerline strip 136 when the tear guide 89 is pulled from its end 142. The tear guide 89 might be a little difficult to tear at the beginning of tear 146 because there is the force of top glue/adhesive/2-sided tape layer 144A below liner 144 adhering to the tear material 135 to the seal insert subassembly 138 trying to de-laminate the tear material 135 from the seal insert subassembly 138 when in fact one wants to tear the tear material 135 down its centerline strip 136, rather than inadvertently de-laminate the tear material 135 from the seal insert subassembly 138 which would certainly result in an unwanted failure because in that event, a much wider amount than the tear-guide 89 width would try to be pulled through a limited size constriction in the toner hopper 97 resulting in a jam, a tear-guide 89 that can not be pulled all the way through, resulting in a failure. Thus, the preferable result would be to tear the tear material 135 along its centerline 136. This problem can occur where the initial tear is made at location 146. One way is to use slits, but another way is to have no adhesive at the beginning of the tear 147 as shown in Figure 38B. When die-cutting the seal-insert 148, the die-cutting process can make a kiss-cut that cuts only through the liner and adhesive 144A and possibly slightly deeper of the shape as shown in region 147 whereby

the adhesive can either be removed in these regions 147 and 150 as shown in Figure 38B or the adhesive 144A of the seal-insert 149 can be masked as shown in Figure 38C at regions 151 and 152. Figure 38D shows another way of masking and/or removing the adhesive 144A from a seal-insert 155 by cutting a "V" pattern or "M" pattern in the adhesive and removing the adhesive at regions 153 and 154 or optionally masking over the adhesive in regions 153 and 154. Other patterns are also possible of either adhesive masking, adhesive removal or lack thereof, but to define every possible configuration and pattern would be a big task and this invention incorporates all shapes and configurations of mask area or adhesive removal area at either or both ends, similar to 147, 151 and 153, noting that this can be done and is a part of this invention. Now, and this is a very important part of this invention because it makes it easier to tear the tear-material 135 at the beginning of the tear 146. When a tearing force by the tear-guide 89 is applied to the beginning of tear 146 region, the tear will be controlled by not only the tear-guide, but also it will be controlled by the lack of adhesive holding the tear-guide 89 and tear-material 135 to the seal-inserts 148, 149 and 155 of the beginning of tear 147, 151 and 153 and thus the beginning of the tear 146 will be controlled by this lack of adhesive at the beginning of the tear. There are two conflicting forces at work here. First, when the tear-guide 89 is pulled, there is a force trying to de-laminate the tear material subassembly 137 right off of the seal-insert 138, 148, 149, or 155. The second force is the tearing of the tear-material 135 along the centerline 136 of the tear-material 135. A third force is the pull trying to remove the seal-insert 138, 148, 149 and 155 from the toner hopper 97 after installation. So which will occur the tear of the tear-material 135 along the centerline 136 or the de-lamination of the tear material subassembly 137 from the seal-insert 138, 148, 149 or 155? The applied forces will try to do both operations at the same time when the initial pull is made on the tear-guide 89. In the seal-insert 138 of Figure 38A, it can tear some and de-laminate some and thus a failure will occur sometimes but it usually will work alright but will occasionally fail. This occasional failure is not good enough in an industry that demands

perfection. So, by either removing or masking off some of the adhesive/2-sided tape/glue 144A at the beginning of the tear, you have thus, if properly done, favored the tear-material 135 to be torn rather than cause a failure by de-laminating the seal tear subassembly 137 or any unwanted portion thereof. You have now control over the initial tear 146 to prevent de-lamination of the tear material subassembly 137 from the toner hopper slot opening 159 in the toner hopper 97 and can prevent this type of failure.

In the second approach to Figure 36, the centerline 136 of the tear material subassembly 137 has longitudinal kiss-cuts 136 that control the tear rather than a tear guide. In this view, the tear pull strip 89 is contiguous with the tear material subassembly 137 and not a separate material as in the previous paragraph, and made of the same tear material 135. But all the principles of the above paragraph apply the same way with the only difference being that the tear pull-strip 89, being contiguous with and made of the same material as the tear material subassembly 137, therefore does not have a hump at the longitudinal centerline caused by the thickness of the tear-guide 89 glued to the tear material 135 as in the previous embodiment. This bump can cause leaks at the beginning of the tear region and the end of the tear region. To compensate for this, a thick adhesive with gooey properties that can fill the grooves must be used as in the previous embodiment. With this embodiment, there is no such bump and special glues/adhesives are not required to fill in where the kiss-cut region 147, 151 or 153 is at. If the kiss-cut touches the adhesive 144A, then it may require special glue or adhesive, but if the smooth surface touches the adhesive layer 144A, then there is no place for the toner to leak and the kiss-cuts of the centerline 136 control the tear and also help control the initial tear to tear rather than de-laminate the tear material subassembly 137. Please note that when I refer to a kiss-cut, I am referring to a precision cut that cuts part way through the tear material 135 in the tear material subassembly 137 whereby the tear-guide 89 is contiguous with the tear-material 135 and the tear-subassembly 137, is all one piece. There exist some materials that tear straight and tear nearly straight anyway. But the kiss-cut can help aid these

materials or many other materials as well to tear straight without requiring the use of a tear-guide 89 that is not contiguous with the tear material 135.

Figure 37 shows yet a third approach to do the same as in the last two paragraphs but this time the tear material subassembly 153 has no tear guide and has no kiss cut. The tear material 135 here is made of a material that tears straight or nearly straight such as a polypropylene, not excluding other materials, with a linear stretch to it that causes the material to tear straight or nearly straight. Thus, the tear-guide 89 is not required and cost is reduced. Use of such polypropylenes has been done before and is admitted prior art from the Honda patent number 5,177,540. But what is unique here is using the device and methods of figures 38B through 38D in conjunction with Figure 37 to control the initial tear to be a tear rather than to be a de-lamination of the entire tear subassembly 153. Figure 37 consists of a tear subassembly 153 that uses a contiguous tear-pull-strip 89A to pull on material identical to that of the tear subassembly 153. Note that this initial tear-control method and device also makes the initial tear easier to do requiring less force to pull. The concept of reduced tearing force has been discussed in the 5,523,828 reference using little cuts at the beginning of the tear, an aperture of the seal-insert 138 at the tear region, but did not disclose adhesive masking, a lack of adhesive, or kiss cut at initial tear regions such as 147, 151 and 153. My invention optionally uses a masked area or lack of adhesive area also at the end of the tear regions 150, 152 and 154 as well. The nice thing about masked areas 151 and 153 is that by kiss-cutting, or not cutting all the way through all layers, when assembling, the liner 144 will peel off leaving liner 151, 153, 152 and 154 on the seal-inserts 149 and 155, and thus, one labor step is reduced with this improvement. Inventor used to have material masked on a production line requiring an assembler to hand-place a piece of the tear-guide 89 in a region similar to 151 to mask it. It varied in dimension too much, and consistency was desired since location of masked material varied so often, only by machine-made markings such as 151 and machine made kiss-cuts 151 can consistency be achieved. With a die-cut controlling the dimensions of the mask 151

and 152 of the invention, every masked area is identical and optionally, the adhesive liner may be used as the mask, reducing the labor required, because this way, the laborer leaves the little piece of adhesive liner 151 and 152, 153 and 154 on the seal-insert 149 and 155 without guessing where to place the tiny piece of adhesive masking material. Also, it should be pointed out that hand-masking by guessing or "eyeballing" has been done in production by inventor since 1994, it should be disclosed, but controlled or precision-masking is a recent invention, not yet shown to the public.

It should be pointed out that in Figures 38A through 38D, in all embodiments contained herein, the layers 143, 144 and 145 can be depicted differently. This patent has plenty of drawings, and in order to minimize the number of drawings, these versions will be depicted by Figures 38A through 38D, rather than repeating these drawings twice or more times. This applies to all embodiments that use Figures 38A through 38D contained herein. In one view of these figures, 143 is plastic or cardboard while 144 and 145A can be either glue, adhesive or two-sided tape. In another outlook, all 3 layers can represent a two sided tape or a transfer tape where 143 represents the center portion of the tape or carrier while 144 and 145B are the adhesive. In another view, 143 can be the glue/adhesive/2-sided tape while 144 and 145 can be the protective liner of the adhesive. All possibilities of the above are to be incorporated in this description throughout as possible configurations of seal inserts 138, 148, 149 and 155. There are infinite possibilities.

In patent number 5,523,828, a seal assembly is discussed that reduces the tearing force required to pull a tear subassembly such as that described as 153 combined with perimeter adhesive. This patent uses slits(cuttings), foam, an aperture, rows of holes, an opening, two cuts at the beginning of the tear, a support under the pre-tear, which may be at either or both ends. In *this* present patent application, not only is the tearing force lowered as described by patent number 5,523,828, but also, the tear is controlled and de-lamination of the tearing subassemblies 137 and 153 is prevented by using the device and

methods described above. It should also be pointed out that *this* inventor's patent number Re. 35,529 shows the first positioning stiffener device and dates back to January 1993 while patent number 5,523,828 disclosed a stiffener in September 1994, around one year and eight months later.

It should be pointed out that the embodiments of Figures 38A to 38D may be expanded for use in the seal of patent number 5,523,828. A seal assembly has been made that has a stiffener device similar to that of patent number 5,523,828 that uses the embodiments of Figures 38A to 38D to control the initial tear of the tear-material. Although this invention has been described, one embodiment is to make the seal assembly of that other patent but instead use the removal of adhesive at the tear opening 147 and 153 to control the initial seal tear, and also can use the kiss cut of the adhesive liner 151 or otherwise mask an entry portion of the adhesive in order to control the seal's initial tear. This may be done with a 2-sided tape, transfer tape, glue, adhesive, foam tape, plastic gasket with either 2-sided tape or glue on any or all surfaces, cloth tape, paper tape, foam tape, plastic tape, polyester tape, acrylic tape, rubber cement, rubber based adhesive, hot melt adhesive, hot melt pressure-sensitive adhesive, pressure sensitive adhesive, wood glue, TIGHTBOND CEMENT, plastic wood, caulk, latex based adhesive, silicone based adhesive, resin glue, SUPERGLUE, LIQUID STEEL, army surplus glue, or any other adhesive or tape material in existence and by default any tape or adhesive material that did not yet exist at the time of this writing.

Please note that seals as in many of the figures have an inherent problem that might not seem obvious at first glance. For example, going back to Figure 3C, where the tears are shown, particularly the tear labeled 92, it can occur that when pulling on the tear-guide 89, when the both tears labeled 92 are supposed to continue tearing after pulling, there can be occasions when, rather than both tears 92 tearing, either 92A and/or 92B may instead de-laminate, peel off of the seal-insert of the seal assembly 109. When this occurs, a failure of the entire toner cartridge takes place which is very costly to the end-user who

needs a toner cartridge, is costly to the retailer who sold the toner cartridge, and even more costly to the toner cartridge remanufacturer who has to pay all costs incurred and for the cost of the shipping of a failed toner cartridge as well as a replacement "no cost" toner cartridge to make up for the failed toner cartridge. Not mentioning an unhappy if not lost customer, his type of failure can be very costly. Inventor has a solution. First the solutions mentioned in embodiments of Figures 38A through 38D show a solution to this type of problem. However, that described solution would not be complete if not for a process that can be done on the seal-assembly 109, which is also applicable to other seal assemblies. It consists of using a press, a hydraulic press, motorized press, flywheel press, punch press, clicker press, clamshell press, arbor press, hammer press, hammer, or any other device that exerts a pressure. For example, an arbor press may be used to exert a pressure on the ends 92A and 92B as well as the middle between the slits 92 and 92 shown in Figure 3C. This may be done with or without the slits. For example, the press may be pressed on all regions, 92, 92, 92A and 92 B all at once, or may press each region individually. Press may be machined on the hammer pressure area to be indented to fit the contour, optionally. The press's hammer or pressure rod may have different smoothness for a different effect. For example, the hammer head may be perfectly smooth for a good pressure to cause adhesive to adhere. Press may be rough with bumps. It may have little pyramid shaped points or bumps, octahedrons, half octahedrons, spikes, nails, removable nails, removable spikes, knurls, single knurl, double knurl perpendicular to each other, lines, sharp lines, points, or other shape. The purpose of the pointed and other shapes is to stick into the adhesive and plastic of the seal-insert in order that the tear material 93 (Figure 3C) will not de-laminate or peel off of the seal-insert 138 (Figure 38A). In some applications, pressing on the end of the seal assembly 109 on the ends 92, 92A, 92B, with a coarse or rough material that "digs" into the material will accomplish a more permanent adhesion than otherwise, almost like "crimping" the tear material 93 into the seal-insert 138. The adhesive can ooze into the little pores or scores from the pressing action. This

pressing action will essentially "crimp" the tear-material 93 into the seal-insert 138 for long-lasting, if not permanent bonding. It should be pointed out that since 1994, inventor has used the pressing procedure on seal assemblies as in Figure 3C with seal-inserts as in Figure 38A, on a regular, commercial production basis for resale seal assemblies 109. The same is true of neutralizing the adhesive with a small strip under the initial tear. However, inventor has just begun using the press and neutralization together without the slit. Recently, inventor was confronted with a patent of a competitor who has a patent on the slit, and inventor had to develop a way of making this seal without the slits 92. Inventor found that using the embodiments of Figures 38B, 38C, and 38D, in combination with using the press along the edges and middle of the initial tear, caused a controlled tear, a tear that never fails, a tear that is identical all the time, without requiring an initial tear. Thus, when the end-user pulls the seal assembly similar to 109, or other seal assembly, but any seal assembly that does not have cuts 92, that the initial tear is totally controlled and easier to tear than otherwise, and thus, failure in the field is prevented. Although inventor has used tears with an a press previously and has used adhesive masking underneath the initial tear previously, inventor had not previously used this technique without the tear, a novel and new way of controlling the way the initial tear takes place. Inventor has only recently made this discovery and it was not obvious from prior art. In prior art, the pre-tears 92 were required, and the press on the ends and the middle were just to insure that the material did not de-laminate. The precuts 92 controlled the tear, not the masking and pressing. However, it was recently found that the labor of performing the precut 92 has been eliminated with this innovation and the initial tear is controlled even better than previously with either of these innovations as well as both innovations combined, that is, the pressing and the adhesive masking. To further improve the device and process, inventor also recently developed the die-cutting where the adhesive will be either masked or removed as shown in Figures 38B through 38 D, already described, and also incorporating the pressing of the ends 92, 92, 92A and 92B without making cuttings

shown at 92. It should be pointed out that this press technique, adhesive masking, controlled kiss-cut die-cut adhesive masking or removing may be used on any seal device of this patent, any prior art in this patent, any seal assembly that tears in existence, and for any seal assembly that tears that does not yet exist.

Figure 39 shows a simple seal assembly 109 with a tear-guide 89 and a slot 139. This seal assembly has been improved in Figure 40 by having the liner 154 on the seal have an easy-pull region 155 of liner with no adhesive that is easy to grab.

Figure 41 shows a toner hopper assembly with a sidewall seal installed in it. A prior art sidewall seal assembly 165A is shown in Figure 48 from patent number 5,621,508. The sidewall seal has a base attach portion 174A and a sidewall attach portion 173A which attaches to the sidewall 158. The sidewall seal assembly 165A attaches to the base of the toner hopper 97 covering the slot opening 159. When the tear-guide 89 is pulled, the tear-guide controls the opening in the seal. Figure 41 shows a sidewall seal 167 installed in a toner hopper 97. When the tear-guide is torn, the sidewall seal opens up a channel for toner to fall through. Figure 42 and 43 shows a sidewall seal assembly 165 being prepared for installation. As can be seen, the installer must first remove the protective adhesive liner 171 to expose the adhesive 170 for use. But as can be seen, there is a positioning support device (brace) 166 that stiffens the seal to be manageable while installing in the toner hopper 97. Once the sidewall seal assembly of this invention 165 is installed, the disposable positioning brace 166 is then removed. This provides an easy installable method and device for installing the very difficult sidewall seal 167 in its location. Previously, the sidewall seal 167 was installed as shown in Figures 44 and 45 by inventor where the liner is not removed until after the sidewall seal is put in position. This is a very tedious process and therefore, the invention significantly improves upon the old method and device. Figure 46 shows yet another improvement of the sidewall seal assembly 165. An easy-pull liner 202 is shown for easy removal of the liner 171 of the sidewall seal assembly 165. Figure 47 shows the cutaway of a toner hopper 97 with a

sidewall seal 167 installed in the toner hopper 97. The backwall portion 173 attaches to the backwall 158 of the toner hopper 97 while the base 174 of the sidewall seal 167 fits over the base of the toner hopper 97 so that the sidewall seal 167 covers the slot or opening 159 of the toner hopper 97.

Inventor owns patent number 5,296,902 that discloses a seal-insert with a tape or heat-tape that removes from the covering of a slot. Figure 49 shows another embodiment of a sidewall seal. This seal assembly 203 has a sidewall seal-insert 176 with a slot 177 where toner falls through. The seal portion 175 may be either attached with heat tape or regular tape/adhesive/2-sided-tape, fitting nicely over the slot 177. It must be larger than the slot 177 in order to both cover the slot and also to adhere to some of the surface of the base 204 of the seal-insert 176. Thus after this seal insert 176 is installed by the toner cartridge remanufacturer, the end-user who receives the toner cartridge pulls on the seal 175, be it tape/adhesive/2-sided-tape or heat-tape, and the seal 175 de-laminates from the seal-insert 176 for an easy-pull seal. Of course this seal assembly 203 or the seal assembly 165 of Figures 42 may be installed with a more sophisticated positioning tab brace device 181 as shown in Figure 50. The brace 179 has a brace base 182, a brace sidewall 181, and all the options already described for removable braces in this patent. Partial length tabs 180 are optional as well as a full length tab 183 for ergonomic removal of the brace/sidewall seal assembly 178 and easy installation of the seal-insert 167. The release liner 171 of the sidewall seal-insert 167 is also shown in Figure 50.

Figure 51 shows a prior art perimeter seal 184 of patent number 5,080,745. The seal 184 consists of a strip of flexible film with a pull end 185 and a perimeter adhesive 186 located typically in a rectangle with no adhesive in the center region 187 of the rectangle. If you look at the patent, it shows a very difficult procedure of installation that involves a little bit of origami, a little bit of skill, and a lot of luck. This process patent 5,080,745 shows not only a lot of folding and an insertion tool involved in the installation process, but it also involves a lot of maneuvering to make certain that you are grabbing the

correct arm of the strip. This seal, in its prime, was the best seal on the market, as it is credited as being an early OEM look-alike seal in the aftermarket that fits directly over the opening 133 in the toner hopper 89. It is still a good seal. Only now, this seal may be installed even easier using the positioning brace 190 with its removable adhesive 189 adhering it permanently to the brace 190 and removably to the seal assembly 184 of Figure 52. Also, it has been further improved by adding a protective liner protrusion 188 on the liner 191 whereby the liner has no adhesive over this protrusion. All the same features of a seal assembly using the stiffener positioning device 190 are shown in Figure 52. The partial length tabs 37 are shown, the full length tab 38 is shown, and these integral tabs can be located on any edge of the positioning device 190. This drawing of this perimeter seal 184 is the most ergonomic way to make this seal at this time. Perhaps the perimeter seal could have a comeback. However, even though this is a perimeter seal 184 in the drawing, it should be noted that the perimeter adhesive could cover the entire attach rectangle of the nonadhesive region 187 inside the perimeter adhesive, for the simplest design to manufacture.

Figure 53 through 57 relate to patent number 5,296,902 by the inventor. This patent involves a seal-insert 192 with a slot 193 in the center, a back leg of the seal-insert 192, a front leg 195, and a seal 196. This seal assembly 205 is a simpler version of the seal assembly 203 of Figure 49, only does not have the sidewall. The seal 196 covers a slot 193 in the seal-insert 192 and is thus, wider than the slot. The seal may be either a tape/adhesive/2-sided-tape seal or a heat-seal whereby heat is applied to attach the seal to the seal-insert 192, which may be conveniently done by the manufacturer at the seal factory. This embodiment may have all the features of Figures 15A, 15B, 27, 28A, 28B or 52 for userfriendly installation. The positioning installation brace, just like all the other positioning installation braces may be made out of plastic, metal, cardboard, hard rubber, or any stiff material, but is shown in the figure 55B.

Figures 58-60 show embodiments improving the Prestel seal of patent number

5,110,646. Figures 58 and 59 were taken out of the Prestel patent to show the cumbersomeness of the installation of this seal. If you have ever held a 9 inch piece of loose tape, and experienced how it sticks all over the place, you can imagine how difficult it is to use the seal of that patent, as described. After practice, it gets easier, however, by using the invention of Figure 60, the Prestel seal becomes much easier to install. By merely adding a positioning brace 200 to the seal assembly 198, using a tape that is designed to stick permanently to the brace 200 but adhere removably to the seal 198, installation of a rigid Prestel seal becomes easy and simple. The stiffener device 200 may optionally have partial length tabs 37, full length tabs 38, folds or creases 76 and may be positioned in any configuration imaginable on the seal 198.

Figure 61 shows an ergonomic seal-assembly 247 similar to the recovery blade assembly 206 of Figure 11C. It consists of a tear subassembly 248 and a seal-insert 249. In one embodiment the seal-insert 249 may consist of a 2-sided-tape/glue/adhesive/(plastic with tape or glue on each side) 265 with a release liner 264 on top and a release liner 266 on the bottom. Optionally, for easy hand-assembly/manufacturing of the assembly 247, the bottom release liner 266 is made of a rigid material such as a cardboard or cardboard like release liner 266. Rigid release liners such as cardboard or plastic may be found in the automotive adhesive supply industry in varying degrees of thickness and rigidity, so multiple choices exist of adhesives with heavy duty release liner. The reason that a rigid release liner 266 could be appropriate here is because it would facilitate hand assembly of the seal-insert 249 to the tear subassembly 248, and this is an important part of the embodiment. Not everyone knows of these heavy duty release liners. Note that although the top release liner 264 is shown on top of the seal-insert 249 in Figure 61, in a breakdown of the seal assembly 247 embodiment, in practice, this top release liner 264 would be removed from the seal-insert 249 before being assembled with the tear subassembly 248 to make the seal assembly 247. The seal-insert 249 has a slot 263, a left side 262, and a right side 261. The tear subassembly 248 is composed of three basic

layers, the positioning support stiffener 250, the preferential adhesive 251, that is designed to stick permanently to the support stiffener 250 and removably adhered to the preferential tear material 252. The tear subassembly has a left side 260 and a right side 259. The narrower right side 259 of the tear subassembly 248 is called the tail 255. The tail has three layers, the stiffener layer 256, the preferential adhesive layer 257 and the tear material layer 258. The tear subassembly 248 has a back kiss-cut region 253 and a front kiss-cut region 254, where the positioning stiffener 250 and preferential adhesive 251 have been cut through. Thus, the preferential tear-material 252, has either not been cut through or has been barely cut through, enabling the removal of the entire tail 255, beginning at 250A and 251A to be removed. Then the seal assembly 247 may be installed by removing the entire release liner 266 to be attached to a toner hopper. Then, the installer may grab the tear material 252 at position 252A and then also grab the installation support stiffener 252 to easily and precisely install the seal assembly 247 into a toner hopper 97. The installer may then remove the entire positioning stiffener 250 and preferential adhesive 251. In the typical case, a fold, crease, indentation, or slight cut may be made at the region between the back kiss-cut 253 and the front kiss-cut 254. Thus the user may remove what remains of the positioning stiffener 250 and preferential adhesive 251 after installing the entire seal assembly 247 into a toner hopper. As with the other embodiments of Figure 28C and 28D, the kiss-cut regions 253 and 254 may be multiple kiss-cuts or may be one kiss-cut, although Figure 61 shows it as multiple kiss-cuts. The result after installation is flexible material 252 adhered with a gasket-shaped glue/2-sided-tape holding the flexible material 252 onto the toner hopper 97.

Note that any blade improvement contained in this patent application may be a recovery blade, keeper blade, wiper blade, doctor blade, plastic doctoring blade, spreader blade, or any other blade used in a toner cartridge, or other Xerographic imaging machine. Furthermore, any positioning device/brace/support member/splint/stabilizer/installation support/setting device/reinforcing member/spine in any embodiment of this patent

application may be made of any material whatsoever, not to exclude plastic, cardboard, paper, metal, rubber, foam, foam-rubber, open-cell, closed-cell material, urethane rubber, plastic with metal plate, plastic with metal coated surface, plastic with aluminum film, antistatic plastic, antistatic material, non-antistatic material, single layer material, double layer material, multiple layer material, composite material, vinyl, polycarbonate, PETG, acetate, MYLAR, fibrous material, fiber reinforced material, stranded material, cloth material, polyethylene, polyester, TEFLON, DELRON, polypropylene, extruded material, rolled material, heat-rolled material, wood, cross-grained material, molded material, any paper product, any paper derivative product, any plastic derivative product, magnetic material, nonmagnetic material, notched material, baked material, heat-treated material, laminate, FORMICA, spring material, spring-steel, spring brass, spring bronze, conductive material, nonconductive material, pressed material, die-cut material, cross-linked material, stressed material, nonstressed material, coated material, conductive coated material, brace material, material with two smooth surfaces, material with one smooth and one rough surface, material with two rough surfaces, material with one or more surface of a matte finish, clear material, opaque material, radioactive material, nonradioactive material, reflective material, nonreflective material, heat or light reflective material, antistatic material, or any material whatsoever.

Please note that any urethane for any blade in this invention may be made of conductive coated urethane, partially conductive coated urethane, loaded with conductive material to be conductive in the manufacturing of the urethane, or may be made conductive using conductive carbon black. One way to add the conductive component to make conductive urethane of varying resistivities/conductivities is to load the urethane in manufacturing with a conductive carbon black filler. It is like pigmenting color only instead of regular black it is conductive carbon black. Compounded in a 50% loading of black in color concentrate. The maximum load is around 10% to 12% conductive carbon black, although the loading varies with material thickness. With a 20 mil urethane, 10-

12% loading is maximum load. With thinner material it is less because the thinner the urethane, the more difficult it is to load. Before extruding, the urethane is in the form of conductive pellets. There are many applications of blades in toner cartridges and imaging machines, some not mentioned here, where conductive blades may be desired. There are antistatic reasons, charging reasons, and other reasons, but any conductive or partially conductive blade in a toner cartridge or imaging machine may be incorporated into this invention using any of the embodiments.

Materials that may be installed with stiffener/support/brace/positioning device include any plastic, cardboard, stiff paper, paper, flexible material, film, metal, metallized plastic, paper, paper products, paper derivatives, foam-like material, foam, foam rubber, rubber, hard rubber, open cell material, closed-cell material, urethane, urethane rubber, neoprene rubber, silicone rubber, cloth, fiber optic material, medical materials, medical bandage, medical skin splicing materials or any other material. The embodiments of this invention may be used to install any devices or strips, plastic, cardboard, paper, any material with slots, any material with openings, gaskets, horseshoe shaped material, u-shape material, v-shape material, w-shape material, or any material or device of any shape.

Please note that any embodiment contained in this patent application may be incorporated into any other embodiment and if any such details may be inadvertently left out, it can be thus incorporated into any embodiment. Also, there are many other versions of seals and strips that could use the improvements of this invention that were not mentioned specifically by name or defined specifically, and the inventor wants to reserve his right to incorporate the embodiments of this invention further into any similar device or structure to the uses described in detail in this patent application. It should be pointed out that in Figure 61, the kiss-cut is made at regions 253 and 254, also shown in Figure 62-63, which is the same as Figure 61, however, with an improvement at the right side 259 of the seal assembly 247 area. However, the kiss-cuts 253 and 254 can be as many as desired without limit, and there can be specific reasons to make the kiss-cuts in

other places as well. For example, a kiss-cut is made toward the right side 259 of the seal-assembly 247. By having such a kiss-cut toward the right side 259, a pull-handle 267 can be integrated into the design of the seal assembly 247. This is similar to the ergonomic recovery blade assembly 206 of Figure 11C which also has a handle 214 integrated into the design. Just by making a kiss-cut, a handle is made, not by coincidence, where the adhesive 271 of the handle 267 is covered with a stiffener 270 so that the handle 267, when pulled by the end-user, will not be sticky from the adhesive 271. Yet at the same time, the handle 267, if only comprised of the handle flexible tear material 272 integral with the preferential tear-able material 252 to tear preferably unidirectionally, whereby this handle 267, without the stiffener 270, would be difficult to grip and difficult to grab, and would curl around in random direction every which way. Utilizing the stiffener 270 it has the built-in handle 267 that does not have to be added, but can be simply kiss-cut into the existing design while manufacturing with no additional labor required. The existing stiffener handle 267 can act as a thread-through guide 267. The flat and stiff thread-through handle 267 is a simple piece of plastic 270 located at the end 259 of a tail 294. Although the plastic has no limit in thickness, it should be in the typical case between .005" and .050" , however, for convenience I use .010" LEXAN polycarbonate plastic which I buy in rolls for continuous flow operation. The handle 267 of this invention is already an integral part of the stiffener 256 attached to the seal assembly 247, but merely was generated by making a kiss-cut for easy manufacture. Also, the pull handle 267 may be made of any stiff material, but by the nature of this design, it should be made of the material that the three major layers of the seal-assembly 247 is made of. The stiffener 270 of the handle 267 may be made of plastic, metal, cardboard, paper, or any material that the stiffener 250 is made of, the same as what the stiffener 256 is made of. The adhesive 271 may be made of the same material that the adhesive 251 is made of, however, a permanent adhesive at 271 would be preferable, so the stiffener 270 may be reinforced.

I will now list the advantages of the pull-handle 267, similar to the pull-handle 214

of the recovery blade assembly 206. First, the pull-handle 267 allows the end-user to pull on a stiff material 270 to more easily pull the seal assembly's 247 tail 255 tear-able material 258 of the tear subassembly 248. The original OEM seals have tails that contain an injection molded pull handle(not shown). Rather than being injection molded like the OEM pull-tab, the handle 267 is simply kiss-cut 280 through the stiffener 256 and the adhesive 257, cut through the stiffener material 250, material that otherwise would be peeled off and disposed of when installing the seal assembly 247. The injection molded OEM handles are not kiss-cut into a stiffener support 250 and also are not made to thread-the-needle through a narrow opening 268 to fit under the endfelt 269. The prior art OEM pull-handles are much too wide to completely fit through the narrow passage 268 of a toner hopper for easy threading-the-needle which would be impossible. The OEM handles typically have a protrusion that fits in a stationary way on the outside of the toner hopper merely to signal the end-user that the brightly colored pull-handle is there for pulling.

A disadvantage of this built-in handle 267 is that it is adhered using the 2-sided tape/glue 251 that adheres permanently to the stiffener 250 and removably adhered to the tear-subassembly 248. Thus, if care is not taken, the handle 267 can peel off of the tear subassembly 248 at the right side 259 of the tear subassembly 248. However, this can be prevented by having the remanufacturer installing the seal assembly 247, simply lift up the handle 267 slightly and place a small amount of glue under the stiffener portion 270 or the adhesive portion 271 of the pull handle 267 and the stiffener material 270 will adhere better to the right side 259 of the tear material 272 on the handle 267. Another cure would be to place a small piece of tape over the handle and over the tear subassembly 248 to more permanently join those 2 subcomponents. One could even tape (scotch tape for example) around the handle 267 and tear subassembly 248 to prevent the handle 268 from falling off.

If you now review Figure 3E, you can see a narrow opening 268 on the LX toner hopper 97 where the tail 258 must feed through this narrow opening 268, and also under

the leftmost endfelt 269. To feed this tail 258 through this narrow opening 268 is similar to threading a needle. A flexible thread has a difficult time feeding through a needle hole because it is flexible and not stiff. Similarly, the right side 259 of the seal assembly 247 of the tear-able material 252 is very flexible and lacks stiffness. By providing stiffener to the tail 258 using the stiff handle 267 made of the stiffener material 250, it is much easier to "thread the needle", is much easier to feed the tail 258 of the flexible tear subassembly 248 through the narrow constriction or channel 268 and under the left most endfelt 269 of the LX toner hopper 97 as shown in Figure 3E. Other toner hoppers have a similar problem, for example, the XP5/10 toner hoppers have a narrow constriction that the tail 258 must feed through in the remanufacturing of the toner cartridge, just as it does the LX toner hopper. Thus, by having a pull handle 267, it is easier to feed the end 259 of the tail 258 through any opening it must be fed through.

It is also an advantage to have a built-in handle 267 because it eliminates the need for an injection molded pull handle, as is the current practice, which also indicates to the end-user where to pull from. The pull handle of this invention can be recycled, made of the tail 258 and stiffener support 270 that would otherwise be disposed of anyway. A flexible tail 258 without a handle does not have as good of an appearance as one with a handle. Also, in any case, the end-user likes and even expects to have something to pull on for the product to have a good feel and look. Also, the pull handle can have printed on it something such as "PULL", or "PULL HERE" or another such message printed right on it for the end-user's benefit and convenience. It makes the remanufactured toner cartridge finished product look like a worthy product. The pull-handle can even be made in a bright color, for example in a fluorescent color, to be easily seen. Also, bright pressure-sensitive label media or other film may be used to bring the pull-handle 67 to the end-user's attention, and the bright label paper can read "PULL" or "PULL HERE" or something else.

Figure 63 shows the device of Figure 62 with the middle portion 292 of the

stiffener 250 removed as is done prior to use. Figure 64 shows the placement holder device 281 that will be referred to as the PHD 281. The PHD 281 has a right portion 282, a left portion 283 and a middle portion 284. The PHD 281 has a side 285, a right end 286, a left end 317, a right bend 287, a left bend 288 a top surface 318 and a tape side 296 (not shown). The PHD typically has 3 general layers (or more), the top stiff layer 289, the adhesive/tape/glue/2-sided-tape layer 290, and the release liner layer 291. The adhesive/tape/glue/2-sided tape layer 290, in the preferable mode, is composed of a permanent-removable tape 290 that sticks permanently to the top stiff layer 289 on the left portion 283 on the bottom surface 319, and the removable portion surface of the adhesive 290 preferably touches the release liner 291 of the PHD 281. It is not totally critical that the adhesive 290 be permanent-removable as some permanent-permanent adhesives/tapes will be removable anyway, but a permanent-removable tape/adhesive is designed to be removable scientifically. The PHD 281 may be used for installing multiple times. However, it can especially be used for installing the recovery blade assembly 206 of Figure 11C, the seal assembly 247 of Figure 63, or almost anything whatsoever. The PHD 281 may be used as a placement holding device for almost any object whatsoever, without much limit. The PHD 281 may even be used to pick up small parts such as screws, bolts, nuts and so on from hard-to-reach places. However, the PHD 281 is particularly well adapted for installing any strip whatsoever, even more particularly for installing any strip that has a stiffener device such as the positioning support stiffener 250 shown in Figure 63, such as a seal assembly 295 as shown in detail in Figure 65 and 65A or the recovery blade assembly 206 previously shown in Figure 11C, and shown as 206A in Figure 65B. The seal assembly 295 with the PHD 281 is easy to use. The toner cartridge remanufacturer simply removes the liner 291 from the PHD and places the PHD 281 onto the seal assembly stiffener 250 as seen in Figure 65. Then the remanufacturer removes the adhesive liner 266 from the seal assembly 295, grabs the holder portion 298 of the PHD 281 and uses that holder 298 to adjust the position of the entire seal assembly 295. After

the seal assembly 295 is put in place, the remanufacturer presses down on the seal assembly 295 to cause the adhesive to adhere to the toner hopper. Optionally, the remanufacturer may use a burnishing tool or a jig or something similar to enhance the adhesion between the seal assembly 295 and the toner hopper 97 (as shown in Figure 3E). It should be pointed out that Figure 65 shows one way of positioning the PHD 281 onto the seal assembly 295. However, as can be seen in Figure 65A, in order for the seal assembly 295 to easily fit into a toner hopper unlike the toner hopper 97, the PHD 281 could be installed 180 degrees (or any amount different) different than that shown in Figure 65, and Figure 65A is shown as such an example. Then, the stiffener device 250 and adhesive/glue/tape 251 is to be removed from the seal assembly 295. Then, optionally, the remanufacturer may remove the PHD 281 from the remaining stiffener 250 and may re-use the PHD 281 for multiple uses. Just how many uses the PHD may be used for depends on the particulars of the adhesive/glue/tape 290 used as well as the environment. Similarly, the PHD may be used to install the recovery blade, any blade of any kind, any strip of any kind, and much more. The PHD 281, if it did not have the bends 287 and 288, would be a flat piece of plastic. This configuration would be functional as a placement holding device, however, one, two or more bends has an advantage over a flat plastic placement holding device. The bends 287 and 288 as in the configuration of the PHD 281 has the advantage that the seal assembly may be placed in a toner hopper 97 that has an overhang 320 as shown in Figure 3E. The bend allows the seal-assembly 247 to be installed inside the overhand, under the overhang, in any hard-to-reach place, and inside the only place where the seal-assembly is to be placed. It is very difficult to place a seal-assembly inside and under the overhang using human fingers. However, with the PHD 281, the seal-assembly 247 may be properly and easily positioned in place, even under the overhang 320 and even inside the overhang 320.

Figure 65B shows a recovery blade assembly 206A, similar to the recovery blade assembly 206 of Figure 11C. The only difference between the two recovery blade

assemblies 206 and 206A is that the recovery blade assembly 206A has a PHD 281 attached to the stiffener device 211. To use this assembly 206A, the installer first removes the liner 291 of the PHD 281 and places the PHD 281 onto the stiffener support 211 of the recovery blade assembly 206A. The installer then removes the adhesive liner 207 of the recovery blade assembly 206A to expose the adhesive. Then the installer may grab the recovery blade assembly 206A by the holder 298 of the PHD 281 to install the recovery blade assembly 206A onto a waste toner hopper 2. Then the installer should press or burnish the surface recovery blade surface along the inner perimeter to help adhere the recovery blade assembly 206A to the waste toner hopper 2. Then the installer should grab the recovery blade assembly 206A by the handle 214 and remover the stiffener 211 and adhesive 210 leaving only the recovery blade portion 209 in the waste toner hopper 2. Of course, the PHD 281 may be removed either prior to or after removing the stiffener 211 and removable adhesive 210 for further re-use. In grabbing the recovery blade assembly 206A handle 214, the installer may bend the recovery blade assembly 206A at the kiss-cut 220 in order to ease installation of the blade assembly 206A and removal of the stiffener 211 and adhesive 210, and this bending may be done either before or after installation of the recovery blade assembly 206A into the waste toner hopper 2.

Figure 66 shows a packaging configuration system for the PHD 281 where the PHD's are grouped in multiples for easy and quick manufacturing. In this first configuration, a PHD grouping 299 is shown, with many PHD's 281 grouped together in one manufacturing unit 299. Each PHD 281 is adhered to with one common tape 300 or other material with adhesion. The adhesive liner 301 is shown as a byproduct, but the tape/ adhesive/glue/2-sided-tape 300 is not required to be 2-sided as one-sided tape will also work well, but in some cases, it may be preferred to use 2-sided tape. Then when the toner cartridge remanufacturer uses a PHD 281, all he/she has to do is to peel, tear, cut or otherwise remove one PHD 281 off the grouping 299 of PHD's 281, remove the protective liner 291 and begin use, as already described. The packaging style 299 of Figure 66 can be

desirable for ease of manufacture and also for ease of the installer to remove the PHD 281 from the grouping 299. Note that the adhesive 290 may be permanent on one side and removable on the side that does not adhere to the PHD, while the adhesive 300 that adheres to the PHD 281 is preferably the removable side of the adhesive so that the PHD 281 will easily peel off the adhesive strip 300. Other configurations of grouping are possible as shown in Figure 66A. For example, the adhesive 300 and liner 301 can be on either surface of the PHD, i.e. top or bottom, for example Figure 69 shows an in-process (not yet bent) grouping 311 where the adhesive/tape/glue 312 and liner 313 on the opposite surface of the PHD grouping 311. However, in Figure 66A, the PHD grouping 302 does not require the adhesive 300 and liner 301 and uses the adhesive 303 and liner strip 304 to hold the grouping 302 together. This takes less labor and material. The difference is not only that the PHD grouping 302 does not use the adhesive 300 and liner 301, but also that the PHD grouping 302 uses the adhesive 303 and liner 304 and the liner strip 304 holds the group 302 together and thus may be manufactured in a continuous operation. The adhesive 303 is kiss-cut 322 up to the liner strip 304 which is continuous. Typically in order to achieve this design, the kiss-cut 322 goes slightly through the liner strip 304, but only enough that the adhesive/glue/2-sided-tape 303 and stiff portion is cut through all the way. When making kiss-cuts such as 322, one must realize that some materials have resilience and also the material underneath may have resilience, and this increases the difficulty in making kiss-cuts 322, and for this reason, a small portion of the liner 304 must be partially cut in order to cut 100% through the adhesive 303. That is the nature of kiss-cuts and one of the difficulties and risks of not doing a kiss-cut 322 correctly. Figure 67 is an in-process configuration 309 that may be a previous step in manufacture of the grouping 299. The adhesive strips 305 and 306 and their liners 307 and 308 are continuously laminated onto the stiff plastic/cardboard/metal material 310 of the pre-manufactured PHD group 309. Then this strip is cut and kiss-cut appropriately to generate the groupings 314 shown in Figure 68. Then, the grouped material 309, after

being cut and kiss-cut forms the continuous configuration 314 is bent to form the PHD group 299 shown in Figure 66.

Figure 67A shows the continuous in-process configuration 323 used as a previous step in the manufacture of the PHD 281 group 302. The stiff material 326 may be continuously laminated with a glue/tape/adhesive/2-sided-tape 324 with a liner 325 forming the in-process configuration 323. This in-process configuration 323 may be continuously cut and kiss-cut to form the further along in-process configuration 327 shown in Figure 68A. All PHD's 281A (not yet bent) attach to one common continuous liner strip 328 that protects the 2-sided-tape/adhesive/glue/tape portions 329 and also holds all strips 281A together. This liner 328 connects all PHD's in one continuous group 327 of PHD's and all the installer needs to do is to peel any individual PHD 281A from the group 327 for easier use than to have to peel off a little piece of liner 241 from an individual PHD 281 (Fig 64) for easier use which is a tedious job at best and requires good fingernails on the part of the installer. Of course, each PHD 281A grouping 327 should be bent to form PHD 281B of group 302 before use, however, this in-process version 327 may also be used. Thus, the PHD 281B group 302 may be formed in a process described, starting with a strip 326 joined or laminated with a tape 324 with a liner 325 to form a continuous strip 323 which in turn is kiss-cut to form the continuous strip 327 with little unbent PHD's 281A which may be bent either continuously or in batch to form the PHD 281B group 302.

The seal assemblies 247 of Figures 62 and 63 may be alternately manufactured as shown in Figures 70-71. The seal-insert assembly 249 may be placed on the seal-assembly 247 without the bottom release liner 266. This adhesive/glue/2-sided-tape 265 may be adhered to the assembly 247. Then a group 315 of seal-assemblies 247 may be installed on one big release liner 316. Peeling off the seal-assembly 247 from the release paper 316 exposes the adhesive 265 for use and is much easier than peeling off the release liner 266 of Figures 62-63 for the installer. It is tedious to peel off the release liner 266 requiring

good fingernails. This is not fun to do. But instead, peeling the seal-assembly 247 from the release liner sheet 316, a seal-assembly package group 315 is an improvement of convenience to the remanufacturers and OEMs who may desire to use these seal-assemblies 247 in an efficient way. The adhesive/tape 265 may be placed on the seal assemblies 247 in gangs and then sheets of release paper 316 may be used to receive these seal-assemblies 247 for production manufacturing of these seal-assembly groupings 315. Furthermore, the sheet of release paper can consist of a release paper on one surface, the surface that touches the adhesive 265 of the seal assemblies 257, and the reverse surface can consist of a printable paper that does not have a release or silicone type surface. This printable side can have anything printed on it. For example, the back side of the release paper can have the licensing Agreement with the installer on it, it could have the instructions and/or tips written on it, or both a Licensing Agreement and instructions may be printed on the reverse side of the release paper. Anything whatsoever, or nothing may be printed on the reverse side of the release paper.

I want to add one more thing. Figures 17 and 27 show a spreader blade assembly 107 and 77. One of the problems encountered with this type of system is that the spreader blade 106 and 63 tend to de-laminate in the field. There is a constant force against the spreader blade 63 trying to de-laminate it from the doctor blade frame 52. It has been recently discovered that by putting in a stiffener strip on the spreader blade surface 223, parallel to and close to along the edge of the glue line 67, along most of the length of the doctor blade 52, the stiffener helps prevent the de-lamination of the spreader blade 63 from the doctor blade frame 52. Part of the reason that this stiffener (not shown) helps prevent de-lamination is because the de-lamination usually occurs in a small local region along the glue line 67. As the forces on the spreader blade 63 try to urge the spreader blade 63 to de-laminate, to cause the spreader 63 to uplift from the frame 52, the stiffness of the stiffener solves this problem by staying stiff and preventing the de-lamination process. Remember, the spreader blade 63 is sandwiched between the frame 52 and the

toner hopper 47 as shown in Figure 5. By having the stiffener between the spreader blade 63 (45) and the toner hopper 47, a squeezing pressure occurs continuously on the spreader blade. It has been found that this stiffener has solved this problem of de-lamination. The stiffener may be made of metal, spring metal, plastic, spring steel, or any material whatsoever. The adhesive of the stiffener on the spreader blade along with the adhesive between the spreader blade 63 and frame 52 increase the amount of adhesive force in prevention of de-lamination. The constant force of de-lamination on the spreader blade is clearly seen in figure 5 where the spreader blade 45 acts like a spring trying to undo the adhesive force holding the spreader blade 45 in place. This version of stiffener device to solve the de-lamination problem works for both the design in Figure 17, Figure 20 and that of Figure 27, or any other strip that has forces in play trying to de-laminate it.

Figure 72 shows another shipping seal assembly 340 which is very similar to the shipping seal assembly 247 in Figure 62. The manufacture of the handle 267 is similarly automated by forming a kiss-cut 280 in the stiffener tail portion 341 near the right side 259 of the seal assembly 340 and then discarding the longer portion remaining of the tail portion 341 along with its corresponding adhesive 257. The tail portion of the stiffener 341 and its corresponding adhesive 257 is disposable and is separated from the rest of the assembly 340 for disposal before use in the region located between both kiss-cuts 280 and 342 in the stiffener material. Similarly, the kiss-cuts 280 and 342 also go through the removable/preferential tape/glue/adhesive 251 at 280 and 343. In order to make a kiss-cut that goes all the way through both the stiffener material 362 and also the removable tape 251, the die must also cut very slightly through the preferential tear-able material 252 although that partial cut not shown will not be noticeable to the naked eye in the typical case.

The main difference between the seal assembly 340 from the seal assembly 247 is the side handle 363 that is used to grab onto the seal assembly 340 when doing the installation. The side handle 363 has an optional fold or crease 344, a bent portion 345,

one or more optional tabs 350 and is located on the support stiffener 335 made of stiffener material 362. Under the side handle 363 of the stiffener material 362 is tape/glue/adhesive 251 with a side kiss-cut 346, side handle adhesive 348, and an adhesive area 351 under the tab 350. The kiss-cut also goes through the preferential tear-able material 252 at location 347 and this forms a side handle portion 364 of the tear-able material 252 with a tab portion 352 of the tear-able material in such a way that when the user of the seal assembly 340 grabs the side handle 363, 348, 364, there is no exposed glue, sticky tape, adhesive or other sticky material to stick to the installer's fingers and the simple kiss-cut thus prevents the handle from being sticky. Consequently, after the seal assembly 340 is installed by using the support stiffener portion 335 in the installation process, the entire stiffener material 362 is removed (except on the handle 267) along with the permanent-removable adhesive material 251 (except the portion 271 of tape 251 under the handle 267) by simply pulling on the removal tab 365 of the stiffener portion 335 and it will lift up the tape/adhesive/glue 251 with it. It is this removal process that explains why the removal tab 365 protrudes somewhat beyond the seal-insert 249. Thus, when the support/stiffener 362 is lifted up to be later disposed of, also, the tape 251 lifts up, and the sidehandle tape 348 attached to the stiffener 362 lifts up with it as well as the side wall handle 363 as well as the side handle tear-able material 364 attached to the side handle tape 348. The removal tab 365 can alternately be located at the left end 366 of the seal assembly 340 and can protrude any distance to form a de-lamination starter in removal of the stiffener 362 and corresponding tape 251. The main difference between the seal assembly 247 and the seal assembly 340 is the side handle 363 that is made in a very simple way involving simple kiss-cuts 346 and 347 and one reinforcing bend 344 to reinforce the stiffness of the support stiffener 335. The positioning stiffener support for all embodiments of seals, strips, and gaskets disclosed can be multi-layered and even include a flexible layer such as tape to prevent the handle from falling off in case the kiss-cut depth is too deep.

Figure 73 shows an embodiment of seal assembly 355 which shows another way to

achieve the effect of rigidity with an add-on stiffener reinforcer 356. Just as it is described as a stiffener reinforcer, that is just what it does. The stiffener reinforcer 356 provides extra support and rigidity to the positioning stiffener support 354 and to prevent the stiffener 354 from being banana shaped` which is why the bend 344 was in the previous seal assembly 340 embodiment. The stiffener reinforcer 356 is made of any stiff material such as plastic, cardboard, metal, stiff paper, or any other stiff or rigid material, preferably LEXAN plastic which is very rigid. The stiffener reinforcer 356 differs from the bent material in patent number 4,862,210 by Wooley in that the Wooley bent addition did not require stiffness and in fact was for the purpose of preventing leakage in a corner and had nothing whatsoever to do with stiffening the Wooley re-usable seal. The stiffener reinforcer 356 has a fold or bend 360 to give it rigidity. The stiffener reinforcer 356 has a base portion 357 and the bend 360 separates this base portion 357 from the back portion 358. Under the base portion 357 is a glue/tape/adhesive 359 used to attach the stiffener reinforcer 356 to the stiffener 354. The reinforcer 356 may even be bonded chemically or otherwise or ultrasonically attached to the stiffener 354, or attached in any other permanent way. Under the stiffener 354 is preferential adhesive 251 which then attaches to the stiffener 354 in a permanent way and to the tear-able material 252 in a removable way. Thus, in this embodiment, rather than bend the stiffener 335, the stiffener 354 is reinforced with a component that already has a bend to simplify manufacturing. Thus, to install this seal assembly 355, one first removes the protective release liner 266 and then the strong adhesive/2-sided-tape/glue 265 is exposed and ready to be installed. The user then grabs the seal assembly 355 by the positioning stiffener support 354 and/or by the stiffener reinforcer 356 and then positions the seal assembly 355 onto the toner hopper 97.

Then, the user presses down on the seal assembly 355 to secure it in place so the 2-sided-tape/glue/adhesive 265 will hold in the region 354 that stiffens the tear-able material 267 covering the toner hopper 97. The user then lifts up on the removal tab 365 in order to lift up the positioning stiffener support 354 and this support 354 lifts up along

with the tape 251 below it and the stiffener 356 and tape 251 are then disposed of. Then the remanufacturer puts toner powder in the toner hopper 97. Then the non-adhesive tear-able material portion of the tail 258 is placed over the seal adhered in position 367 and a small portion of the tail 258 sticks out of the toner hopper along with the handle stiffener 270 which is adhered to the tail 258 at the 272 region. The toner cartridge remanufacturer finishes assembling and remanufacturing the toner cartridge. Then after the end-user receives the toner cartridge he pulls on the handle 270 which then tears the tear-able material 252 to the width of the tail 258, along the toner blockage region 367 creating an opening in the toner blockage region 367, thus allowing toner to pass through the passageway. Then he disposes of the tail and torn portion of the tear-able material 252 that was previously covering the toner hopper in the toner blockage region 367. Now the toner cartridge is ready for use.

Figure 74 shows a prior art PX toner hopper 442 with a toner storage reservoir 449, a toner passageway 443 and an attach area 444. The attach area 444 has a top 445, a bottom 446, a left side 447 and a right side 448. Figure 75 shows a PX toner hopper 442 with a partially installed seal assembly 340. In this figure, the tear material 367 is adhered to the attach area 444 to cover the toner passageway 443 showing the tail 258 of the tear material 252 protruding to the right of the figure. The tail portion 341 of the stiffener 362 has already been removed in preparation for assembly. The installation positioning stiffener support 335 is shown being removed with its corresponding adhesive 271 after the installation support stiffener 335 has already been used to perform its function of stiffening the seal assembly 340 while it is being installed. After the installation stiffener support 335 is removed with its adhesive 271, it is disposed of and the seal installation is complete. Then the remanufacturer fills toner in the reservoir 442 through the toner fill hole 450 which is the closed up and the toner cartridge is then assembled. Then the end-user pulls the handle 267 which pulls the flexible tear material of the tail 258 which tears the length of the seal and this tear opens the toner passageway 443 so that toner can flow

and the toner cartridge may be used.

One of the problems inventor has encountered in manufacturing the seal assembly 247 (Figure 62) is that although the permanent-removable adhesive was removable after installation, after manufacturing some seal assemblies 247, the stiffener 292 and adhesive/glue/tape 257 would not peel off of the tear-able material 252 over the tail region 258. In fact, what occurred is that the tail portion 258 of the tear-able material 252 began to tear and become unusable before the device was even complete. So, seal assemblies 247 that were assembled quickly were completed and those that were laminated with adhesive and completed at a much later date were unusable. The reason this problem occurred is because although the adhesive was permanent-removable, and there are many permanent-removable adhesives on the market, however, most of these adhesives tend to cure in time. So although the adhesive may be applied on a Monday, by four Mondays later or so, the adhesive is not actually removable where it was intended to be removable. This is because the adhesive cures onto the tear-able material. Also, in the case of the recovery blades with the handle and removable stiffener, the permanent-removable adhesive tended to cure somewhat, but not quite to the point of becoming unusable. However, I would not want a recovery blade made with that tape to remain on the shelf for a long time. It is good that customers used them soon after. After inventor experienced this problem, inventor found a solution. The solution is simple. Just as simple tape has a treated release paper, the material to be released, i.e., the tear-able material in one embodiment and the recovery blade portion 209 of the recovery blade assembly 206 in the other embodiment, may be coated the same way that release paper is coated using a release coating. Most such coatings are silicone release coatings, and inventor is not an expert at all the various release coatings, but can purchase release coatings to go onto the removable material 209 or 252 so that as the permanent-removable adhesive 210 and 251 begins to cure, the release coating will prevent a permanent adhesion between layers that are designed to be removable. Thus, the tear-able material 252 may be treated as a release

paper and similarly coated to ease later removal. This has been successfully tested both in seal assemblies 340 as well as in ergonomic recovery blades 35 and 206.

Using a release coating on the removable material to adhere to the 2-sided-tape/glue/adhesive 251 treats the tear-able material 252 as if, in theory, it is a release liner, which in theory it is because it will release. By treating the tear-able material 252 as a release liner, the integrity of this invention is enhanced by preventing the 2-sided-tape/glue/adhesive 251 from curing and bonding to the tear-able material 252, in order that this invention may function properly. When using release agents, it has been found that too much release material is not good and a proper balance of adhesive strength and release coating slipperiness must be maintained before using release treatments. Adhesives and release treatments must be tested over time together to prove combinations are worthy of use because adhesives cure over time. Figure 76 shows a typical gasket 396 as used in many different industries including the toner cartridge remanufacturing industry. The gasket has a left leg 397, a right leg 398, a back 399, a front 400 and a center portion 401 that is leftover from the die-cutting process and falls off or is separated before use. Gaskets 396 come in all sizes and shapes and are typically used to form a seal between two components that join. Thus, although the shape of the gasket 396 is rectangular, this shape is not a limit in gasket technology nor of the invention to be disclosed. A gasket will usually fit the contour or perimeter of the components to be joined and so a rectangular part is just used to keep the example simple. There are two things not shown in Figure 76. First, many gaskets have a pressure-sensitive adhesive and release liner as well that is not shown in Figure 76. There is a major problem with such gaskets. Mainly, the gaskets, which prior to installation do not have the center portion 401 and thus, when installing, the legs 397 and 398 bend, twist, curl, flap and flex in many different contortions. Once the release liner is removed, this flexible gasket will stick to anything and everything it comes into contact with including itself. Thus, a purchased gasket can often get ruined before or during installation. If it does not get ruined, it can take a considerable amount of time

carefully placing the gasket 396 in place because it requires a certain amount of precision and hand-work. Obviously, if someone quickly installed a gasket 396 in place in one motion, it would probably not be positioned correctly. It would probably fail. To correctly position a gasket 396 would require several human positioning motions. The installer would have to position each of the legs 397 and 398 because they are thin in a sequence of many positioning motions. Even a very experienced assembler would require time to install the gasket 396, but would be faster at installation than an average person. I know this firsthand because my company has a production line where gaskets are hand-installed all day long, among other steps, and it takes time and skill.

For this reason, I have designed the userfriendly gasket assembly 370 shown in Figures 77 through Figure 82. This gasket assembly 370 has a stiffener support 371, a permanent-removable tape 372, gasket material 373, permanent tape 374, release liner 375, a handle 381, a right side 389, a left side 390, and a center 403. The userfriendly handle 381 is separated from the rest of the gasket assembly 370 by a kiss-cut 404.

The center portion 403 is formed by a kiss-cut through all layers, (optionally layer 372) 373, 374, and 375 but not through the positioning stiffener support 371. The kiss-cut sometimes goes through the tape 372 and partially through the stiffener 371 as a byproduct of the kiss-cut process.

The handle 381 has different layers, each comprised of the materials of the gasket assembly 370. For example the handle 381 has the release liner 382, the tape 383, the gasket material 384, the permanent-removable tape 385 and the stiffener 386. Please note in the figures that the stiffener layer 386 does not have a kiss-cut 404 as do the other layers. The stiffener layer 386 is contiguous with the stiffener support 371. For this reason, it will later be seen how the handle 381 will be pulled or lifted up to begin removal of the entire layers of stiffener 371 and permanent-removable tape 372. Note that although the kiss-cut 404 in the figures actually goes through the permanent-removable tape 372, that this is actually not necessary, but often in kiss-cutting, when the above layer

of any material is cut to a tape 372, the tape acts like a shock absorber, and therefore, the kiss-cut will go to the next hard surface, and therefore the kiss-cut goes through the tape 372 to the stiffener layer 371 only as a byproduct of the kiss-cut process. It should be pointed out that this will not always be the case with all materials, so it should be noted that the kiss-cut depth only need go through the gasket material 373. When this is possible it may be done. There is a gasket center 403 for each layer, for example there is a center 391 in the release liner 375, a center 392 in the permanent tape 374, a center 393 in the gasket material 373, an optional center 394 in the permanent-removable tape 372 and there is no center in the stiffener-support 371. When the kiss-cut to the handle 381 partially goes through the stiffener layer 371, it has the advantage of guiding a fold between the handle 381 and the non-handle portion of the gasket assembly 370. It has the disadvantage that too much kiss-cut when folded can cause the handle to undesirably break off.

Figure 80 shows the gasket assembly 370 with the release liner 375 in the process being removed for preparation of gasket assembly 370 installation. Now and this is an important part of the invention as follows that is true of the strip assembly 206 and the side handle 363. Note that while the release liner 375 is removed that the release liner 382 of the handle 381 stays on the handle. This is important for two reasons and is very unique compared to any prior art known to inventor and is shown more clearly in Figure 81 in the next step. In the next step, the gasket assembly 370 is installed in place and then the handle 381 is grabbed to remove the entire stiffener support 371, the permanent-removable tape 372 and the handle 381 which are then disposed of. By grabbing a handle 381 with the release liner 382 still in place, the installer does not have to touch a sticky handle 381, and the installation stays clean and userfriendly. Also, by leaving the release liner 382 on the handle 381, there is less labor required by the end-user as per removing the release liner 375, and this protective release liner 382 is left on the handle 381 simply by doing a kiss-cut 404 during the gasket 370 die-cut process.

Now and this is another important part of the invention. Figure 82 shows the

installed portion 406 consisting of the gasket material 373 installed along with the permanent adhesive/glue/2-sided-tape 374 holding it in place and the disposable portion 402 removed. Note that the disposable portion 402 consists of the centers 391, 392, 393 and 394, the stiffener support 371, the adhesive layer 372, and the handle 381 intact with its layers 382, 383, 384, 385 and 386. By using this device and method, the installation is very simple and the gasket assembly 370 can be manufactured with total automation processes and no hand labor processes. Thus with this embodiment, not only is the installation labor by the gasket assembly 370 installer minimized and the time quicker, but also, the manufacturing process of the gasket assembly 370 is also enhanced by employing total automation and no hand labor. The die-cutting process may be done on any automated die-cutting press, flat press, rotary press, steel-rule die press, clamshell press, rotary steel-rule die, steel-rule die using a rotary pressure wheel, clicker press, or any die-cutting press whatsoever. With gaskets of prior art, centers of the gaskets must be removed prior to use, which costs money to do. With this invention, the center is left in the center for all layers and all centers are simply removed by removing the disposable portion 402 of the gasket assembly 370 without ever detaching any of the center portions. Of course, with this invention, any of the centers 391, 392, 393 may optionally be removed before use, and some less flexible gasket materials 373 may require removal of the centers 391, 392 and/or 393.

The gasket assembly 370 could also have reinforcing bends and/or side handles 363, 348 and 364 similar to that of Figure 72 where the material 364 instead of being tear-able material for a seal-assembly 340 could be made of gasket material 373 and any features disclosed of the seal-assembly 340, recovery blade assembly 206, or any other assembly may be incorporated into the gasket assembly 370. Also, the gasket assembly 370 could have a stiffener reinforcer 356 shown in Figure 73, incorporating any features of the stiffener reinforcer 356 that may attach to the stiffener positioning support 371.

There are many types of gasket materials available where this embodiment would

be a benefit with no limit, whether rigid material or flexible material since even a metal gasket assembly could lose rigidity and shape with long legs 397 and 398. A stiffener support 371 would prevent the long legs of even a metal gasket material from pinching or buckling and thereby narrowing the gasket opening 403. Gaskets 373 and strips 209 in strip assemblies 206 may be made of many materials. In many applications listed below, the stiffener strip 211 or 371 can be made of a non-stiff flexible material used just to gain better control in installation of materials used for gaskets 373 and strips 209 in strip assemblies 206. Materials used for gaskets 373 and strips 209 in strip assemblies 206 may include using foam, foam rubber, metal, plastic, urethane, rubber, urethane rubber, open cell foam, closed cell foam, ether foam, ester foam, polyurethane foam, cardboard, paper, ceramic, hard rubber, soft rubber, flexible material, rigid material, sponge, cork, glue, tape, cloth, fiberglass, elastomer, non-stretchy material, wood, wood derivative, particle board, fiber, cellulose, weather strips, window strips, door strips, picture frame strips, screen strips, screen material for installing it into a frame, picture material for installing it into a frame, photographs for installing into a frame, silk-screen material for installing it into a frame, rock, stone, marble, glass, tissue, spring material, non-springy material, LEXAN, PETG, ACETATE, NYLON, VINYL, MYLAR, GORE-TEX, TEFLON, DELRON, single ply material, double ply material, triple ply material, multiple ply material, composites, a composite material, CELLOPHANE, polyester, polyethylene, molded material, extruded material, treated material, heat-treated material, coated material, printed material, photocell material, semiconductor material, solar cell material, silicon, conductive material, partially conductive material, electrically resistive material, insulative material, printed circuit board, edible material, inedible material, poisonous material, explosive material, dangerous material, safety material, flammable material, fire retardant material, army surplus material, navy surplus material, military material, surplus material, recycled material, brand new material, bandages, adhesive bandages, GORE-TEX, STERISTRIP, surgical strips, skin attach strips, dermatologist skin attach strips, burn center skin attach

strips, decals, stickers, bumper stickers, high class packaging tape 209 that comes in strip assemblies 206 instead of rolls, pinstripes in the sign and automotive industries, pressure-sensitive signs, campaign signs, highway signs, jigsaw puzzle mounting material, pressure-sensitive labels, return address labels, postage stamps, postage meter stamps, pressure-sensitive stickers, pressure-sensitive logos, bio-materials, artificial human skin, skin graft material, adhesive suture strips, temporary tattoos, price stickers, license tags, fabric, pressure-sensitive fabrics, fabric decals, iron-on adhesive fabric strips, egg decorating decals, felt art, tape picture hanger mounts, foam tape picture hanger mounts like MANCO part number [[__]] HV-15 that you see at department stores, pressure-sensitive correction tape, airport printed luggage tracking tags, medicine patches, hormone patches, nicotine patches, tire patches, bicycle tire patches, automobile tire patches, vehicle tire patches, electronic wire numbering labels, telephone box labels, circuit box labels, pesticide strips, bug repellant strips, repellant strips, bookbinding strips, a coated (partially conductive coating) strip to go on a spreader blade (as disclosed in inventor's patent #5400,128), and any material whatsoever.

As noted above, a wide variety of differing material may be installed with this gasket assembly 370 because the installer only touches the release liner 371 and the stiffener 375 and does not touch the inner layers, and thus this device 370, just like the strip assembly 206 may be used with difficult material, hazardous material or sterile medical grade materials. The strip assembly may even be used in certain medical or surgical applications. For example, a special medical bandage could be made with a handle and a strip like the strip assembly 206, as a bandage application, or a stitch application. A special medical bandage could be manufactured with total automation, and therefore untouched by human hands, where the strip portion is the bandage material and may be used for cuts and to replace stitches, for example. This invention is much simpler than medical stitches and requires less effort to install. These surgical band aids that can replace stitches could be made out of varying widths and lengths. The doctor, nurse, or

medical technician would then cut the usable strip portion to length and the device has a handle for easy install as well as a positioning stiffener support. For example, GORE-TEX could be applied easily in such an application among other materials. Also, strip assemblies 206 can be made with an intentional curve to install upon curved structures. For example in the bandage and stitches industry (tape surgery), STERISTRIP is the prior art and similar materials are used in surgery to reattach where surgical cuts have been made, but if such a tape was applied as the strip 206, then it would be easier to work with. In surgery using STERISTRIP, TINLKLEBEN glue is first applied so the STERISTRIP will stick well and a similar medical strip can be applied using the strip assembly 206. The final product using this invention in surgical and medical bandages and attachment devices would have to be sterilized and usually sterilization is done using gamma radiation, for example. Dermatologists and burn specialists could use an invention like this to install skin replacement materials, bandages and things to make skin stick together. The strip assembly 206 could be used as the installation device which can be totally automated in manufacture. Surgical tapes could be applied too using this strip device as well as home use of simple BAND-AID strips. A pick up device for small or hard-to-reach parts could be made of this strip assembly 206, however, for a pickup device, the handle release liner would be removed so that the strip assembly 206 can pick up parts. This can have applications in many industries including electronics and automotive mechanics.

Figure 83 shows a top portion 407 of an EX split toner hopper. The toner hopper was split in half to make a top portion 407 and a bottom portion 419 shown in Figure 85. These toner hopper halves 407 and 419 are normally put together with a gasket such as 396 between them, and the gasket 414 is shown in Figure 84 to prevent leakage with also a shipping seal assembly 429 on the bottom portion 407 of the split toner hopper as shown in Figure 86.

The top portion 407 of the split hopper has a left side 408, a right side 409, an upper side 410, a bottom side 411, a developer roller 412 and a toner-low sensor bar 413.

The gasket 414 has an upper portion 415, a lower portion 416, a right portion 417 and a left portion 418. When installing the gasket 414 which is similar to the gasket 396, the gasket takes time to install because the gasket 414 is very flexible and is so flexible that it takes time to install and the installer must be careful not to ruin the gasket, as the gasket will stick to anything it touches including the installer's fingers, other parts of the top portion 407 of the toner hopper, the workbench and to itself.

After the gasket 414 is installed onto the top portion 407 of the split toner hopper and the seal assembly 429 is installed into the bottom portion 419 of the toner hopper, the bottom portion 419 is then filled with toner powder and then the top portion 407 and the bottom portion 419 are joined together to form a contiguous toner hopper (not shown). This toner hopper is then ready for assembly into a toner cartridge.

The gasket 414 could have been replaced with a gasket assembly 370 of this invention for userfriendly application and this is one good example of the multitude of possible applications of the userfriendly gasket assembly 370.

The seal assembly 429 will be described in greater detail. The seal-insert 427 and seal portion 431 are shown in inventor's patent number 5,296,902 issued 3-22-94. In the patent it states that the seal may be adhered by either tape or heat tape, a material that becomes gluelike when heated to a certain temperature. Then as the heat-glue cools and solidifies, the material is adhered in place. Such a seal assembly 429 as described by that patent is shown in Figure 86. Figures 87 through 89 show inventor's improvements on such a seal system, the clean system.

Figure 87 shows a seal subassembly 435 for an EX toner hopper, consisting of the seal portion 436, the tape portion 437 underneath, and this tape portion 437 has an opening 438 where toner can pour through. Figure 88 shows a seal subassembly 435 being placed onto a seal-insert 439, similar to the seal-insert 427 if Figure 86, to form a seal-insert assembly 441. Note the opening 440 in the seal-insert 439 and that in the lower part of the figure, the seal subassembly 435 is being installed onto the seal-insert 439 whereas in the

upper portion of the figure, the seal subassembly 435 is already installed onto the seal-insert 439. Note that the tape portion 437 while being installed is still located on the seal 436. So far, what has been shown is similar to that disclosed in inventor's patent number 5,296,902. However, what is shown in Figure 89 is a cleaner shipping seal system than any prior art and is differentiated from the prior art disclosed and is a very important embodiment of this invention. Figure 89 shows the seal-insert assembly 441 as if it is installed in the bottom portion 419 of the EX split toner hopper 419 of Figure 85. In the bottom portion of Figure 89, seal portion 436 is being pulled in the same way as when a toner tear-strip is torn from a toner hopper. However, this is unlike a tear-strip 252 that tears. It is unlike the de-laminating heat tape glue 430 that lifts up with the seal that was disclosed in inventor's patent 5,296,902 shown in Figure 86. It is unlike the de-laminating adhesive tape seal of inventor's prior art patent because the bottom of Figure 89 shows that when the seal 436 is pulled, unlike anything done before, the tape portion 437 stays stuck on the seal-insert 439 and in the pulling process, the seal portion 436 removes itself from the seal-insert 439 and from the tape 437. Prior tape seals have adhesive that stays stuck to the adhesive of seal when the seal is pulled causing the seal to be difficult to pull and making a mess. That explains why up until now, tape seals have been impractical. The hot-seal 431 of Figure 86 uses a glue-free solution when pulling the seal 431 because the heat-seal material 430 is only sticky when it is heated. The reason the tape portion 437 stays on the seal-insert 439 and separates from the seal portion 436 is because this tape 437 is not ordinary tape and is a permanent-removable tape. By using a permanent-removable tape, the seal portion 436 lifts up when pulled while the tape portion stays stuck to the already installed seal-insert 439. This enables easy assembly but also enables the remanufacturer to actually use the seal-insert 439 multiple times. Use of a seal-insert multiple times was described in inventor's prior art patent. However, with no tape sticking to the seal portion 436, the tape will not stick to the foam gasket in the hopper as has always been a problem with tape seals. Tape seals have always been inferior and are

relatively low in use. However, what is disclosed here makes tape seals practical for the first time ever. By using a tape seal where the tape is released from the seal portion 436 upon release, the cost of the seal to the remanufacturer is greatly reduced. It also saves the cost of the seal-insert 439 which can be re-used without requiring reinstallation of the seal-insert 439. The improvement is in quality, less materials used, re-use of seal-insert 439, lower cost and less material winds up in landfills. Figure 89 shows a seal 436 being pulled off to release toner. However, if the tape 437 was V-shaped at the initial pull region or slightly V-shaped there, there would be less force required to remove the seal 436 to open the toner flow opening 423.

Please note that there is a potential danger of using this embodiment. Since the adhesive is removable, toner bouncing around in handling can create pressure against the seal 436 to de-laminate partially or de-laminate prematurely. This danger can be overcome by always designing seals 436 so that the adhesive 437 has enough attach surface area to stay firm on the seal-insert assembly 441 and not come loose. Each application should require a test in the specific toner hopper, adhesive 437 and toner involved. This clean seal subassembly can be used for any packaged materials whatsoever without requiring the seal-insert. For example some toner powders come in tubes and this invention could be used for these as well. It can be used for any powdered material that involves opening up a container. For example a bag of flour can use this embodiment.

In another embodiment, the seal subassembly 435 of Figure 87 may be directly installed to a toner hopper opening. For example, if the seal subassembly 435 was made wider, it could be used to install directly to over the toner hopper bottom portion 419 by attaching the glue/adhesive/2-sided-tape 437 of the seal subassembly 435 directly to the flat attach area perimeter 428 of the bottom portion 419 of the toner hopper to cover up the toner flow opening 423 so that a toner cartridge which uses a toner hopper can be shipped by courier without toner leakage, then when the end-user receives the toner cartridge, he/she may pull the clean seal 436 which separates from the seal subassembly without tape

or glue attached to the seal portion 436 so that the seal portion 436 will slide through easier through the tight foam gasket 414 without tape, glue, or adhesive stuck to the seal portion 436 for easier sliding.

This clean tape seal subassembly 435 may be manufactured with or without a positioning stiffener support for more userfriendly installation after which, the positioning stiffener can be removed when combined with the embodiment shown in Figure 52 of a perimeter tape seal with a positioning stiffener support.

It should be noted that in manufacturing the tape seal subassembly 435, there are different ways to do so. One would be to laminate the permanent/removable glue/adhesive/2-sided tape onto a roll of material that is used to make the strips 436 along or near one edge. Then kiss-cut the centers 438 and/or full-length cuts of each strip 436. Being a removable tape, the kiss-cut centers 438 should easily peel up from each seal subassembly 435. This can either be done by the manufacturer or let the installer remove the centers at a better price. Alternately, the glue/adhesive/2-sided tape material 437 may be cut in the centers 438 only then laminated onto the seal material. Little tiny pieces of material can be left where each cut is made so the cut out centers will remain in place yet be removable. Then the roll of cut glue/adhesive/2-sided tape can be laminated onto the seal material. Then the strips 436 can be cut in proper place. Then the centers 438 of the glue/adhesive/2-sided tape 437 can be removed and the strips 436 cut with paper cutters. In another way, a stiffener on the tape with another removable glue/adhesive/2-sided tape can be used to keep the tape 437 stiff which is then kiss-cut and then laminated onto the seal 436 material. Then the stiffener can be removed. Then the strips 436 can be cut with a paper cutter and then the centers 438 can be removed. There are many more ways to manufacture this tape seal subassembly 435 but these are some of the ways.

Figures 36 and 37 show two examples of choices of tear portions 137 and 153 or

tear-assemblies 137 and 153 that attach to a seal-insert. Some examples of seal-inserts are138, 148, 149 and 155 as shown in Figures 38A - 38D to make a seal assembly such as those seal-assemblies shown in Figures 39 and 40. Figure 40 differs from Figure 39 because it has a release liner protrusion 155 or easy pull region 155 developed for user-friendly removal of the release liner during the installation process of the seal-assembly into a toner cartridge. This protrusion of release liner may be incorporated into most pressure-sensitive shipping-seals. The next embodiments will show an improvement over the simple protrusion 90 of release liner for easy removal of the release liner. However, in a similar vein, and as an introduction to the next seal-assembly embodiment, Figure 11c shows a kiss-cut used to form a user-friendly handle for a generic flexible strip device used to remove a support layer 211 or positioning support 211. Figure 38a shows a generic seal-insert while Figures 38b through 38d show a variety of different seal-insert configurations which may be used in manufacturing seal assemblies involving adhesive masking, and/or lack of adhesive for controlling the tearing process, tearing initiation and minimizing the pulling force required of a tear-seal. Figures 38A through 38D can be viewed in different ways as previously described, just as can Figures 38AA - 38DD, but it can represent a tear-seal that is made rigid or semi-rigid with a middle layer of rigid or semi-rigid material where the final assembled seal assembly will be easy to manage, control and position during the installation process of the seal assembly into a toner hopper as previously described. Having a rigid or semi-rigid seal assembly is equivalent to having a positioning support that is built into the seal assembly that does not require the extra step of removing the positioning support.

Figures 38AA through 38DD may be viewed multiple ways, just as Figures 38A through 38D, as previously mentioned. This involves a scenario where the entire layer 140 is a adhesive/2-sided tape/adherent/glue layer and the outer layers 144 and 145 are release liner. Alternately, the middle layer 140 can be either a tape carrier and the outer layers 144

and 145 can be a tape with release liner. Another possibility is where the center 140 is a rigid or semi-rigid material such as plastic or cardboard and outer layers 144 and 145 would represent adhesive/2-sided tape/adherent/glue layer including a protective release liner. Having multiples of interpretations/representations decreases the number of drawings required.

The previous paragraph leads to an embodiment involving release liner which has a handle 501 for easier release liner removal not merely a protrusion 90 of a release liner and therefore easier installation of a seal-device or strip device. Now, and this is an important part of the invention because there are two kiss-cut depths in the example showing this embodiment. This feature may be used for both strip assemblies and seal assemblies for easy removal of the release liner. Figure 38AA shows a kiss-cut 502 that is cut to the bottom release liner 145 and 505 for easy removal of the release liner. Figures 38BB through 38DD show two levels or depths of kiss-cuts in the seal-inserts 148a, 149a and 155a where the adhesive masking may be made with a kiss-cut at one depth through the top adhesive liner 144 and 507 while additional kiss-cuts may be made in the seal-insert to a deeper depth to the bottom adhesive liner 145 and 505 so that a tab 501 or handle 501 will protrude and this handle 501 may be pulled by the seal installer during the process of seal installation of the finished seal assembly. By pulling the handle 501 it will start the process of removing the bottom release liner 145 since it is attached to the tab 501. A removable closure will cover the opening 139 or slot 139 in the seal-insert assembly such as reference numerals 137 or 153 shown in Figures 36 - 37 to show some examples. In this example, the removable closure uses a tearing means to open up the slot to allow toner powder to go through the slot, although this embodiment is not limited to tear-seals. For example, it may also be used for seals that de-laminate and other seals that attach to the toner hopper with a pressure-sensitive adhesive such as most seals and seal-assemblies described in this application as well as many other seal assemblies, some not yet invented.

The seal-handle for release liner should be practical for almost any seal or seal-assembly that installs using a pressure-sensitive adhesive. Note that it is not necessary to use the adhesive masking blockers 151 and 152 in this embodiment, but was used to illustrate the handle used to easily remove a release liner, as neither are required to be used together. They may be used independently. However, one feature of novelty of this embodiment is that when they are used together, one die can cut both kiss-cuts, even though the kiss-cuts are cut to more than one depth of cut, all in one die-cutting step which adds even greater utility to this combined embodiment.

Just like pulling the handle 214 in the strip assembly 206 in Figure 11c will remove not only all layers of the handle 214, but also remove the entire positioning support layer 219 with its adhesive 218 of the strip device, pulling on the handle 501 on the seal assembly with all the handle's layers 505, 506 and 507 will pull and remove the entire release liner layer 145 without the puller touching sticky material and without having to use fingernails to remove the protective adhesive liner which is time-consuming. I have included this discussion on the strip assembly 206 at this point to show the similarity between this handle used to remove the positioning support layer 219 with a removable adhesive and a similar way to remove the release liner 145 and 207a for both seal devices. It may also be used for strips with some differences. It is nice that there is a release liner protrusion 90 in figure 40, however, things generally work even better with a handle on it, and the seal-assembly device of this embodiment is no exception. Handles are good as there is an expression "I have a handle on it" to mean that the situation is under control. The seal-assembly of this embodiment has a handle on it, and also is easier to use. Note that layers 144, 145, 505 and 507 have been called release liner layers, but there is no adhesive/2-sided tape/adherent/glue layer mentioned that may be attached to the release liner layers which should be included, however, if it is included with the release liner layer, kiss-cuts would go typically go through the adhesive/2-sided tape/adherent/glue

layer and not through the release liner layer and removing the release liner layer would not remove the adhesive/adherent/tape/glue layer as the purpose of the release liner is to protect the usable adhesive/adherent/tape/glue where it attaches to the seal-assembly to the toner hopper. Alternately, the middle layer 140 may be a carrier, tape layer, a layer of rigid/semi-rigid material sandwiched in adhesive/2-sided tape/adherent/glue. Unlike the strip assembly 206, clearly, in this embodiment of the seal-assembly, removal of the tape/adherent/glue portion of layer 145 to be done in the removal process of the release liner portion of 145 except in the handle 501 that is removed.

Pulling the handle 501 of the seal assembly will be used for easy removal of the release liner of the seal assembly as previously described. It saves time and money. It is cleaner, simpler, quicker, less labor intensive and a more efficient use of resources. Thus, with this innovation, seal assemblers and toner cartridge technicians may easily remove the release liner even while wearing protective rubber gloves that are often used to protect the toner cartridge technician/assembler's hands from toner powder during the installation and/or disassembly of toner cartridges. It is more difficult to work with your fingers when wearing protective rubber gloves. Many toner cartridge technicians wear rubber gloves to minimize toner getting on one's hands. With this embodiment, a release liner may be removed quickly, even when wearing rubber gloves. Without the handle 501. The seal installaer must remove the release liner layer to install the seal assembly and it takes longer to do this with fingernails or ice picks, especially while wearing rubber gloves. Even so, an ice pick can accidentally puncture the closure portion of the seal-assembly the installer is not extremely careful, which can cause seal-assembly failure.

Figure 38CCC shows basically the same things as in Figure 38CC but shows a little greater detail. It shows the top release liner 144b and 507b and top adhesive/adherent/glue/2-sided tape layers 144a and 507a separately from the protective

adhesive liner layer, rather than showing these two layers together and rather than requiring mixing the adhesive into the rigid/semi-rigid layer 140 as a simplification as shown in Figure 38CC. That simplification does not precisely show as well that when the handle 501 is pulled, it removes the release liner 145b, but does not remove the adhesive/2-sided tape/adherent/glue layer 145a.

It also shows the bottom release liner layer 145b and 505b as well as the adhesive/adherent/glue/2-sided tape layer 145a and 505a. It shows the rigid or semi-rigid layer 143 and 506. One nice feature of a seal-assembly using a seal-insert 149a such as the one shown in Figure 38CCC is that once the layers in the Figure are laminated, and they can be laminated in-process in a station prior to die-cutting, the die-cut process can cut the entire seal-insert in one die-cut operation. It will not require a two-stage set of dies involving alignment, special registration, and other complications. It is kept simple using one die (and not requiring a series of dies) that cuts to three different depths of cut, depth for kiss-cuts at 151 and 152, a deeper depth for kiss-cut 502/504 and all-the-way through cuts for the rest. Thus, time, money, labor, materials are saved. There is thus less waste due to errors in alignment. There is no extra step in assembly of the seal-device. It is quite simple which adds to the novelty. This idea is a pioneer invention and may be applied to any strip, gasket, seal or any flexible pressure-sensitive installable device in any industry, and is not limited to a toner hopper of the imaging industry but may be used to seal a hopper, container or vessel in any industry that uses powders as well as liquids. The seal assembly of this embodiment may also employ a removable positioning support with or without one or more folds as previously described in this patent application. Note that the masking portion 151 and 152 are not essential in this embodiment, however, it is novel and og great utility that it can all cut in one die-cut step with or without the masking portions 151 and 152. The seal-assembly handle 501 may also be referred to as an initialization handle, a starting handle, a pulling handle, a liner handle or a release liner handle 501.

In an alternate version, the open central region can be kiss-cut down to the release liner 145b (instead of all the way through) and the material remaining in the open central region can stay put, including the top release liner 144b portion over the open central region which would not be peeled in the open central region. After closure is installed over the seal-insert, the seal-assembly installer can pull the handle 501 to remove the bottom liner 145b as well as the open central portion layers 145a, 143, 144a and 144b which will all peel away with the liner 145b, simply by pulling the handle 501.

Figure 11d shows a strip assembly similar to that of Figure 11C, but this one differs as it uses a two level kiss-cut (three levels of cut including the all-the way through cross-cut) of a strip device such as a recovery blade or other strip used in a toner cartridge. It has cuts from top and bottom. This idea is also a pioneer invention and may be applied to any strip, gasket, seal or any flexible pressure-sensitive installable device in any industry, and is not limited to the imaging industry. The first level kiss-cut is located at reference numeral 220 cutting through all layers except for the positioning support layer 219 cutting from the top. The second level kiss-cut is located at reference numeral 220a cut from the bottom. (Of course, the cut from the bottom and top can be reversed, but these are just examples to illustrate the invention) The third level cuts through all layers at 207a and/or 213 and cuts fully through all layers except for the release liner layer 207a. This strip embodiment is difficult to manufacture because the kiss-cut to the release liner shown in this example is hard to make because the release liner is narrower than the strip and the die-blades would have to cut deeper where there is not release liner. An alternate way to cut this kiss-cut to the release liner of this example is to have a temporary strip of material removably adhered to the strip in areas where there is no release liner so that one kiss-cut blade cuts all layers up to the release liner and the temporary strip of material of same depth as the release liner. After the kiss-cut operation this temporary strip of material would have to be removed before use of the strip assembly. For a strip assembly where the

tape and release liner are the same width using the strip this product is easy to make without requiring these special features using an upper kiss-cut 220 and a bottom kiss-cut 220a. One way is to use a die machine with an upper and lower cut where one cuts from above and the other cuts from below. It should be noted that such a strip assembly in any form with or without the described kiss-cuts may be manufactured onto a low-tack-adhesive backed paper so that several pieces attach to and are stored on a sheet. The sheet may be printed on the back to label and identify the product, mark patent numbers and to include instructions to install and instructions to order, as well as company advertising. A tape in continuous rolls is used from the masking tape family, similar to that used by painters whereby after painting they remove the masking tape. A strip 206 like this has been manufactured onto printed paper by inventor's company for at least two years on a production line, possibly longer, using kiss-cut 220, but not 220a.

The previous seal-assembly embodiment showed a seal-assembly with a handle for easy removal of the release liner 145b. However, there is yet another embodiment used for the purpose of easy removal of the release liner from a seal-assembly. However, in this embodiment, the seal-assembly is actually removed from a seal-insert material page 540, 546, 570 or 580 (Figures 71a - 71d and Figures 70a - 70b) and there may be multiple seals on a finished page 550 or 560 for improved storage and inventory control of the seal-assemblies. This new embodiment is an improvement over a simple version of seal removal from a release liner page shown in one of the parent patents 6,356,724, claims 4 through 5, which is one of the parent patents of this continuation-in-part. The previous seal-page embodiment is shown in Figures 70 and 71 using a page of release liner material 316. The process of manufacturing the new embodiment shown in Figures 71a through 71d involves making a kiss-cut into the seal-insert material 545 in page form 540 so that the kiss-cut cuts the outline of the seal-assembly to the depth of bottom release liner 145b, another kiss-cut can cut the masking notches 543 & 544 cut to a depth that goes fully

through the release liner layer 144b and the cut of the center opening 542 and 547 of the seal-insert can either be kiss-cut to the bottom release liner layer 145b and removed or alternately may be cut all the way through all layers shown as reference numerals 542 and 574 for kiss-cut and 547 and 584 for all the way through cuts.

Figures 71a through 71d show examples of different versions of seal-inserts used to make a page of seal-assemblies. The layers of material are the same as the seal-insert material of the previous seal-insert embodiment of Figure 38CCC except there is no handle 501. There is a bottom release liner 145b, a bottom adhesive/adherent/glue/2-sided tape layer 145a, a middle layer that can be of any material including a rigid or semi-rigid material 143, top release liner 144b and a top adhesive/adherent/glue/2-sided tape layer 144a.

It should be mentioned that just because seals can be made with several on a page, one can still use this embodiment to have one seal-assembly on a page. It should also be pointed out that Figure 71a differs from Figure 71b in that Figure 71a has an open central region 542 or open region 542 where the cuts forming the perimeter rectangle 542 are kiss-cuts that cut to the bottom liner 145b and these centers may be removed except for the bottom release liner layer 145b while the region 547 in Figure 71b has a perimeter rectangle that is cut all the way through the bottom release liner layer 145b so that the centers 547 may be completely removed in the region depicted by 547 except that it should also be pointed out that Figure 71c differs from Figure 71d in that Figure 71c has an open central region 574 or open region 574 where the cuts forming the rectangle 574 are kiss-cuts that cut to the bottom liner 145b and these centers may be removed except for the bottom release liner layer 145b while the region 584 in Figure 71d has a perimeter rectangle that is cut all the way through the bottom release liner layer 145b so that the centers 584 may be removed in the region depicted by 584.

Figures 71c and 71d differ from Figures 71a and 71b in that the seal-inserts 572 are joining and separated by a cut and the seal-inserts 582 are joining and separated by a cut (Figure 71c and 71d) while the seal inserts 541 and 548, each respectively is not joined to the next seal insert as there is a space between these seal-inserts. It saves on material costs to use the seal-inserts that join 572 and 582 (separated by one cut) and also on die-making costs versus the seal-inserts 541 and 548 that do not join.

Figures 70a and 70b show the final seal-assembly pages 550 and 560 manufactured using seal-insert pages 540, 546, 570 and 580. To manufacture a seal assembly, as an example, simply take the seal-insert page 540, 546, 570 or 580 and remove the top release liner 144b at reference position 541, 548, 572 or 582 for the seal-inserts, thus exposing the top adhesive layers of each seal-insert for the seal-insert page. Note that the open central regions 547 and 584 are completely removed in al layers while the open central regions 542 and 574 are optionally removed of all layers except fro the bottom release liner layer 145a whcih is part of the page 540 and 570, respectively. Then simply find a closure material, for example reference numerals137 or 153 from Figures 36 and 37 and place these closure materials over the reference positions 541, 548, 572 or 582 where the adhesive is exposed from removing the release liner layer for each seal-insert. Press down with your fingers or and burnish it down or run the page through rollers and thus the pages may be populated with seal-assemblies. Do not remove the masking portions 543, 544, 573, 575, 583 or 585 so that the seal will tear easily if the adhesive masking option is included. Of course, the closure may be seals like those described in patent 5,184,182 for a slide seal, or 5,296,902 for a de-laminating seal-assembly. This method and procedure is a pioneer invention and can be used for most any seal that installs using a pressure-sensitive adhesive/tape since they usually have a protective release liner that protects the adhesive until the seal is installed. Of course, the central open regions may be removed from each seal-insert prior to assembly. However, it can also be manufactured in a way

similar to the gasket of Figure 80 - 81 where the release liner is left on the central portion 542 and when the toner cartridge technician removes the seal-assembly to install the seal-assembly, all layers of the center portion 542 remains on the page 540, thus the page 540 stays more rigid for easier storage and there is no labor in manufacturing the seal page 540 required to remove the open central portion 542. Although it has not yet been stated, the term open region or open central region 542, 547, 574 and 584 are not required to be central, and so this terminology is a misnomer. The open central region can be in any shape and location. It can have notches and the main body portion may also have notches as in the XP-5/10 seal. The seal-insert is not limited in shape nor is the open central region nor is the position of the open central region limited to being in the center.

The seal-assemblies in the examples have main body portions 553 and 563 and pull-strips 551 and 561, although these are used only to show typical tear-seals, they may be used for any seal assembly that installs using a pressure-sensitive adhesive/tape layer, some that do not have a pull-strip. The pull-strip may be either a tear-guide or a material that is contiguous with a tear-material when the main body portion 553 is covered with a material that tears relatively straight. By manufacturing seal-assemblies on pages, it may have an advantage in manufacturing, and die-life as a die lasts longer when doing a kiss-cut than when doing a cut all -the-way through, it makes the seal-assembly easier to separate from the release-liner as the toner cartridge technician may simply grab the pull-strip and pull the seal-assembly right off the page and in doing so the seal-assembly is stripped from the release liner page layer of the and is ready to install, and thus saves in manufacturing steps for the toner cartridge technician. Pages 550 and 560 of seal-assemblies may stack nicely for inventory.

Since minor changes and modifications varied to fit particular operating requirements and environments will be understood by those skilled in the art, the invention

is not considered limited to the specific examples chosen for purposes of illustration. The invention includes all changes and modifications which do not constitute a departure from the true spirit and scope of this invention as claimed in the following claims and as represented by reasonable equivalents to the claimed elements. Any ideas shown in any embodiments may be incorporated into any other embodiments. All references are to be considered as background art of this invention.